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BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 113



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BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 113

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THE EFFECT OF CERTAIN POLYMETHYLENE-BIS-QUATERNARY COMPOUNDS ON MUSCARINIC AND NICOTINIC CHOLINORECEPTORS

Moscow FARMAKOLOGIYA i TOKSIKOLOGIYA in Russian No 3, 1979 pp 234-238

[Article by M. Ya. Mikhel'son, L. L. Protas, G. P. Sokolov, L. A. Starshinova and S. A. Shelkovnikov, Institute of Evolutional Physiology and Biochemistry imeni I. M. Sechenov of the USSR Academy of Sciences and Institute of Organic Synthesis of the Latvian SSR Academy of Sciences, Riga]

[Text] A study was made of the effect of polymethylene-bis-onium compounds with the general formula  $R-(CH_2)_n-R$ , when  $n = 8-11$ , in the heart ventricles of a frog, the arterial pressure of a cat, the small intestine of a guinea pig and the musculus reccus abdominis of a frog. Substances with radicals of the F-2268 type possess strong muscarinic action, maximally marked when  $n = 10$ . The muscarinic action is more strongly manifested with an even number for  $n$  than with an odd number. In the frog's heart, with an even number for  $n$  (8 and 10), a muscarinomimetic effect is observed, and with an uneven number (9 and 11)--a muscarinolytic effect. The nicotinic effect is relatively weakly marked.

Tables--3. Bibliography--6 entries. FARMAKOL. I TOKSIKOL., No 3, 1979 p 234.

A study of a series of polymethylene-bis-acetoxyethyl-dimethylammonium salts--series I (Barlow, 1955) revealed a sharp maximum of muscarinic and nicotinic activity in 10 methylene groups among quaternary atoms of nitrogen. Barlow suggested that this preparation may react simultaneously with the two adjacent cholinoreceptors separated by a distance corresponding to a chain made up of 10 atoms of carbon. It appeared interesting to verify whether a similar maximum of muscarinic activity would be revealed when molecules of dioxolan F-2268 with strong muscarinic action were doubled (Fourneau and coauthors, 1944). A corresponding series II was synthesized, containing from 8 to 11 methylene groups in a chain between nitrogen atoms. In addition, an analogous series III was synthesized in which the nitrogen atoms were included in pyrrolidine cycles. In order to evaluate the significance of the dioxolan groups in series II and the complex ester groups

in series I, a control series IV was also synthesized, with pentyl radicals with nitrogen atoms (Table 1).

Table 1. Synthesized Compounds With the General Formula  $R-(CH_2)_n-R$ 

R	n	series
$-\dot{N}(CH_3)_2CH_2CH_2OCOCH_3$	9, 10, 11, 12	I
$-\dot{N}(CH_3)_2CH_2-\underset{\begin{array}{c}   \\ CH_3-O \end{array}}{CH}-O-\underset{\begin{array}{c}   \\ CH-CH_3 \end{array}}{CH}-CH_3$	8, 9, 10, 11	II
$-\dot{N}-CH_3-\underset{\begin{array}{c}   \\ \text{Cyclopentyl} \end{array}}{CH}-O-\underset{\begin{array}{c}   \\ CH_3-O \end{array}}{CH}-CH_3$	9, 10, 11	III
$-\dot{N}(CH_3)_2-CH_2-CH_2-CH_2-CH_2-CH_2-CH_3$	9, 10, 11	IV

**Methods of Investigation.** A myocardial stria 10 X 2 mm was cut in cross sections from the middle third of the heart ventricle of a common frog, and was placed in a 10-ml bath with aerated Ringer's solution for cold-blooded animals (pH 7.5). The stria was stimulated by supramaximal pulses lasting 10 msec, with a frequency of 0.4 Hz, and the reductions in the isometric regime were recorded. The muscarinic effect was evaluated from the negative inotropic effect, and the muscarinolytic (atropinelike)--from the ability to prevent the action of the acetylcholine.

The arterial pressure of the anesthetized (chloralose 50 mg/kg + urethane 500 mg/kg intraperitoneal) rat was recorded in the common carotid artery. The muscarinic effect was evaluated in a comparison with the effect of the acetylcholine and F-2268 for an equally effective dose.

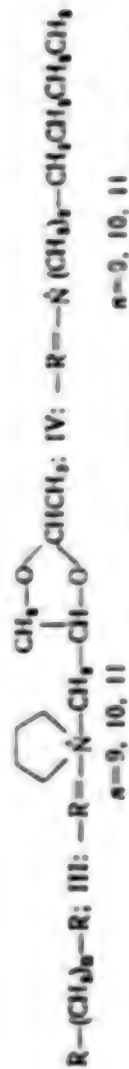
The contractions of the small intestine of a guinea pig, isolated by the Edinburgh Staff (1970), were recorded isometrically in the presence of hexamethonium ( $2 \cdot 10^{-4}$  M). The preparation was added to a 5 ml-bath in the amount of 0.1 ml for 20 seconds. Repeated exposures were made every 3 minutes.

The ability to induce a contraction or block the contraction caused by the acetylcholine was studied in the musculus rectus abdominis of the frog.

**Results and Their Discussion.** With respect to the muscarinic effect on the frog's heart and the cat's arterial pressure in series II, a similar sharp maximum of activity with the 10 methylene groups in the chain was observed as in series I. Both the shortening and lengthening of the polymethylene chain sharply reduce the muscarinomimetic activity (Table 2). This conformity to principle is also revealed in series II in the muscarinic receptors of the intestine of a guinea pig (this test was not used in Barlow's work).



Table 3. Activity of Bis-Quaternary Compounds With General Formulas III and IV (Number of Molecules, With a Different Effect for One Molecule of Acetylcholine)



n	(1) Сервис актуализации		Артритическое действие		(3) Кислотная реакция		(4) Прямая и обратная индукция, моль	
	III	IV	III	IV	III	IV	III	IV
9	Литический эффект (5) 10 мг (6)	Литический эффект (5) 10 мг (6)	Недостоверно	Недостоверно	30.0 ± 5.0 (3)	7.0 ± 2.0 (4)	(1.0 ± 0.2) · 10 <sup>-6</sup> (4)	(1.0 ± 0.2) · 10 <sup>-6</sup> (3)
10	• •	• •	•	•	40.0 ± 10.0 (3)	6.0 ± 1.5 (3)	(8.0 ± 2.0) · 10 <sup>-7</sup> (4)	(2.3 ± 0.3) · 10 <sup>-6</sup> (3)
11	• •	• •	•	•	47.0 ± 17.0 (3)	5.5 ± 1.3 (3)	(5.0 ± 1.0) · 10 <sup>-7</sup> (4)	(8.0 ± 0.9) · 10 <sup>-7</sup> (3)
Анализ (8)	EC <sub>50</sub> = 1.5 · 10 <sup>-7</sup> M		Эффективная доза (9) 0.001 мг/кг		1.0 (EC <sub>50</sub> = 1 · 10 <sup>-7</sup> M)		Анализ, EC <sub>50</sub> = 1 · 10 <sup>-7</sup> M (10)	

Key:

1. Frog heart
2. Arterial pressure of a cat
3. Intestines of a guinea pig
4. Musculus rectus abdominis of frog, antagonistic effect, in water
5. Lytic effect
6. Same
7. Inactive
8. Acetylcholine
9. Effective dose, in 0.001 μm/kg
10. Agonist



In addition to the effect of the total length of the polymethylene chain in series II, the relation of the activity to the even or odd number of methylene groups is noticeable. With an even number, the muscarinic effect is more strongly marked. This was revealed particularly clearly in the frog's heart, where the two substances, when  $n = 8$  and 10, had a muscarinometric effect, and when  $n = 9$  and 11--only a weak atropinelike effect. It is possible that the fluctuation in the activity in series II, depending on whether  $n$  is even, is related to a change in the position of one dihexolane radical with respect to the other.

In the musculus rectus abdominis of the frog (nicotinic receptors), the substances of series II caused no contractions at all, in contrast to the substances of series I and of the F-1268 itself, which possesses moderate cholinomimetic activity in this muscle ( $EC_{50} = 1.7 \cdot 10^{-5}$  moles; full agonist). Conversely, the preparations of series II displayed a marked cholinolytic effect, regardless of the number of methylene groups in the chain (see Table 4). Apparently, the structure of series II (dioxolan radicals), in contrast to series I (acetoxylethyl radicals) prevents the stimulating action on the nicotinic receptors of the skeletal muscles.

Series III, where the nitrogen atoms are included in the pyrrolidine rings, exerts no muscarinometric effect at all on the heart of a frog and on the arterial pressure of a rat with any number of methylene groups (Table 3). With concentrations of over  $10^{-5}$  moles, an atropinelike effect on the frog heart was observed. Probably the presence of the methyl groups with the nitrogen atoms is necessary for the manifestation of a stimulating effect on these muscarinic receptors. At the same time, the substances of series III exerted a muscarinometric effect on the intestine of the guinea pig (see Table 3), which changed little with a change in the number of the methylene groups.

Substituting acetoxylethyl or dioxolan radicals for pentyl radicals (series IV) resulted in the disappearance of the muscarinometric effect on the arterial pressure of the rat (in doses up to 1 mg/kg) and on the heart of the frog. With concentrations of over  $10^{-6}$  M, there was an atropinelike effect on the frog's heart. Apparently, for a stimulating action on these muscarinic receptors there must be either an ester (series I) or a dioxolan (series II) group in the "fourth" radicals with nitrogen atoms.

A completely different result was obtained in the intestine of the guinea pig. In series IV, just as in series II, all the preparations exerted a marked muscarinometric effect, which scarcely varied when the number of the methylene groups was changed. This result indicates substantial differences in the structure or in the mutual arrangement of the muscarinic receptors of the frog's heart and the rat's circulatory system, on the one hand, and the guinea pig's intestine, on the other.

In the musculus rictus abdominis of the frog, the preparations of series III and IV, just as the preparations of series II, not only did not cause contractions, but even had a marked cholinolytic effect, and moreover, in series III and IV this effect increased with an increase in the number of methylene groups in the chain. In the work by A. P. Drozhzhin and D. N. Ibadova (1976), the preparations similar in structure to series IV ( $n = 10$ ), but having, with the nitrogen atoms, not a pentylic, but a butylic or hexylic radical, also manifested a cholinolytic effect on this muscle. The preparations of all three series--II, III and IV--proved to be non-concurrent cholinolytes: they did not shift the curve of concentration to the right--the effect for acetylcholine--but merely reduced the height of the contractions of the musculus rectus abdominis of the frog. Nonconcurrent cholinolytic action of a preparation (series IV,  $n = 10$ ) was described by Ariens and Rossum (1959).

Therefore, cholinomimetic action on both the muscarinic receptors of the heart of the frog and the circulatory system of the cat, and on the nicotinic receptors of the musculus rectus abdominis of the frog is well marked with the preparation of series I when  $n = 10$  and disappears with a substitution of the acetoxethyl radicals, with nitrogen atoms, by pentyl radicals. Replacing the dioxolan radicals (series II) with pentyl also results in the disappearance of the cholinomimetic effect. It may be assumed that the marked cholinomimetic effect on the heart of the frog, the arterial pressure of the cat and (according to the data from series I) on the musculus rectus abdominis of the frog is achieved only when the preparation can react simultaneously with both the anion and the esterophyl sections with a distance between them corresponding to the length of a chain formed from 10 carbon atoms.

### Conclusions

1. Compounds with a general formula of  $R-(CH_2)_n-R$  were investigated. In the series of compounds with radicals of the F-2268 type containing dioxolan cycles, the maximum muscarinomimetic activity was detected when  $n = 10$ . In addition, in this series there is a distinct relation of this activity to the even quality of the number of  $n$ .
2. In the series of compounds with pentyldimethylammonium radicals, all its members have no muscarinic effect on the heart of a frog and the arterial pressure of a cat. All the compounds in the series, however, exert a marked muscarinic effect on the intestine of a guinea pig.
3. All the compounds studied of series II, III and IV have a nonconcurrent cholinolytic effect on the musculus rectus abdominis of a frog, which is maximally marked in the series of compounds with pentyldimethylammonium radicals, and increases with an increase in the number of  $n$ .

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EVALUATION OF CERTAIN PHARMACOLOGICAL PROPERTIES OF A NEW STEROID CURARELIKE AGENT RGH 1106

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian No 3, 1979, pp 239-243

[Article by R. N. Alyautdin, V. V. Buyanov, Ye. Yu. Lemina, V. K. Muratov, D. N. Samoylov, V. P. Fisenko and V. A. Shorr, Department of Pharmacology (Head--D. A. Kharkevich, corresponding member of the USSR Academy of Medical Sciences) of the Therapeutic and Sanitation-Hygiene Schools of Moscow Medical Institute No 1 imeni I. M. Sechenov]

[Text] In experiments made on cats it was shown that the compound RGH 1106 has an antidepolarizing mechanism of action. The sequence of myorelaxation occurring with exposure to this preparation is characterized by relaxation, first of all of the musculus masseter and muscles of the limbs, then of the abdominal muscles and diaphragm and finally, of the intercostal muscles. RGH 1106 possesses no cardiotropic m-cholinolytic activity, does not exert a ganglion blocking effect, does not affect the central nervous system, does not change the myocardial blood supply and its oxygen consumption and does not inhibit acetylcholinesterase.

Illustrations--3. Bibliography--19 entries. FARMAKOL. I TOKSIKOL., No 3, 1979, p 239.

The obvious advantages of the antidepolarizing steroid myorelaxant pancuronium bromide over a number of other curarelike agents aroused interest in seeking active new compounds from among its analogues. As the result of research on this performed at the Gedeon Richter Enterprise (Hungary), the antidepolarizing curarelike preparation RGH 1106, more active than pancuronium, was created, and its pharmacological properties were studied by Szporny and coauthors (1974).

The purpose of this work was to study certain additional aspects of the action of RGH 1106, particularly to determine the comparative sensitivity to the preparation of the synaptic formations of various groups of skeletal muscles, and to investigate the nature of the changes in the electromyographic parameters of the synaptic transmission under exposure to this substance. In addition, on the plane of assessing the possible side

effects of RGH 1106, a study was made of the ganglion blocking, m-cholinolytic and anticholinesterase properties of the myorelaxant, as well as its effect on the myocardial blood supply and the central nervous system. For comparison, for a number of tests analogous studies were made with pancuronium bromide (Pavulon).

**Methods of Study.** The experiments were performed on cats with a mass of 2.5-4.5 kg. Anesthesia was induced by intravenous injection of urethane (600 mg/kg) with chlorase (70 mg/kg) or sodium pentobarbital (40-50 mg/kg).

The comparative sensitivity of the N-cholinoreceptive structures of different groups of skeletal muscles to the preparations studied, as well as the nature of the electromyographic changes in the musculus gastrocnemius with indirect rhythmic stimulation, were evaluated in accordance with methods described earlier (V. K. Lepakhin, 1967; V. P. Fisenko, 1972). The ganglion blocking activity was studied in the superior cervical ganglion, according to D. A. Kharkevich (1962).

The reaction of myorelaxants with m-cholinoreceptors of the heart and vessels was judged from their effect on bradycardia and hypotension, caused by an intravenous injection of acetylcholine (10-20 mkg/kg). The volumetric rate of coronary blood flow was assessed according to the amount of blood flowing from the coronary sinus (N. V. Kaverina, 1958). At the same time, the oxyhemoglobin content in the blood of the coronary sinus and the arterial bed were determined by an oxyhemograph.

The effect of the preparations on various divisions of the central nervous system were studied by the method of evoked potentials. In experiments on decerebrated cats, the mono- and polysynaptic potentials of the spinal cord and also the potentials of the effect of the polysynaptic tongue and jawbone reflex were recorded. In addition, in the experiments on cats anesthetized with chloralose (60 mg/kg intravenously), the primary responses of the cerebral cortex evoked by stimulating the sciatic nerve were recorded.

The myorelaxants studied were injected intravenously. The anticholinesterase properties were studied in vitro using Hestrin's method (1949).

**Results and their discussion.** With optimum rhythm of the stimulation (5 Hz) of the peripheral segment of the sciatic nerve, the injection of RGH 1106 in myoparalytic doses\* (10-15  $\mu$ g/kg) was accompanied by the onset of pessimism (the phenomenon of the "extinction" of the generated potentials of the muscle): repeated stimuli were recorded as poorer than the first one.

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\* The myoparalytic dose is the minimum dose in which the preparation blocks by 90-95 percent the transmission of excitation from the sciatic nerve to the musculus gastrocnemius in cats, with electromyographic recording of the muscle's potentials for action.

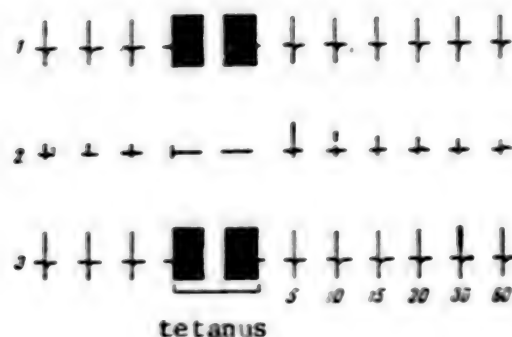


Figure 1. Effect of RGH 1106 on Posttetanic Reactions Recorded in the Musculus Gastrocnemius With Stimulation of the Peripheral Segment of the Sciatic Nerve

1--Before injection of the preparation; 2--3 minutes after intravenous injection of RGH 1106 in a dose of 25  $\mu$ g/kg; 3--2 hours after injection of the preparation.

Solitary stimuli: square supramaximal lasting 0.1 ms each. Tetanic stimulation was carried out for 5 sec (square supramaximal stimuli with a frequency of 100 Hz and duration of 0.1 msec each) and the initial and concluding parts of the tetanus were presented. Vertical line--caliber of the amplitude (1 mV). Numbers below--time (in sec). Here and in figures 2 and 3 is an experiment made on cats anesthetized with urethane (600 mg/kg) with chloralose (70 mg/kg).

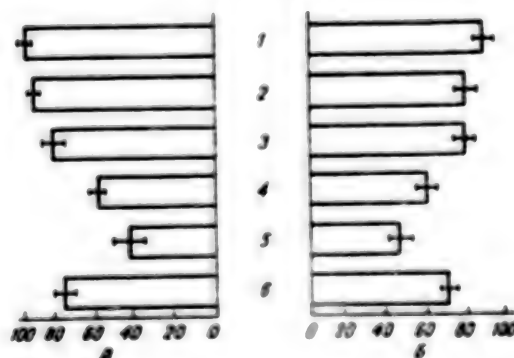


Figure 2. Reduction in Amplitude of Evoked Potentials of Muscles Exposed to RGH 1106 in a dose of 10  $\mu$ g/kg (A) and pancuronium in a dose of 20  $\mu$ g/kg (B)

Columns--arithmetical means with confidence limits when  $P = 0.05$ . Along the horizontal--reduction in amplitude of evoked potentials of muscles (%). 1--n. massetericus--m. masseter, 2--n. ischiadicus--m. gastrocnemius, 3--n. radialis--m. triceps brachii, 4--n. intercostalis--m. abdominales, 5--n. intercostalis--m. intercostales, 6--n. phrenicus--m. phrenicus



The amplitude of the potentials reduced progressively and, beginning with the 4th-5th potential, was established at a constant level. When the frequency of the stimulus was increased to 20 Hz, the marked nature of the pessimal reaction increased. Pancuronium in myoparalytic doses (20-25  $\mu$ g/kg) caused similar changes in the potentials of the action of the musculus gastrocnemius.

Posttetanic alleviation of the synaptic transmission in the musculus gastrocnemius was noted against a background of the action of RGH 1106 or pancuronium (Fig. 1).

It is known (A. V. Val'dman and V. V. Zakusov, 1952; A. I. Shapovalov, 1961; V. P. Fisenko, 1972) that these electromyographic changes are characteristic of the action of antidepolarizing myorelaxants, and this is in turn confirmed by the data of Szporny and coauthors (1974) on the presence in RGH 1106 of an antidepolarizing mechanism of action.

In the study of the sensitivity of the n-cholinoreceptive structures of various groups of skeletal muscles to RGH 1106 it was established that the preparation most of all depresses synaptic transmission in the musculus masseter and muscles of the extremities, somewhat more weakly in the diaphragm and abdominal muscles and least of all in the intercostal muscles (Fig. 2, A). Pancurium evoked relaxation of the skeletal muscles in the same sequence (Fig. 2, B). Incidentally, it is known that other antidepolarizing myorelaxants relax the skeletal muscles in a different order (V. K. Lepakhin and V. P. Fisenko, 1970; Aldersen and MacLagan, 1964). In this connection, the data obtained in this work confirms the assumption (V. K. Lepakhin and V. P. Fisenko, 1970) that n-cholinoreceptive structures of different muscles are not uniform.

In a study of the ganglion blocking properties of RGH 1106 it was established that in a myoparalytic dosage the compound does not affect the transmission of excitation in the superior cervical sympathetic ganglion. The initial suppression of the ganglionic transmission was noted when RGH 1106 was injected in doses of 2-4 mg/kg, and a marked blocking occurred only when the preparation was used in doses of 25-30 mg/kg, hundreds of times greater than its myoparalytic dose.

It should be noted that pancuronium too, according to the data of Bowman and Sandra (1972), in a myoparalytic dose does not suppress the transmission of excitation in the superior cervical sympathetic ganglion of cats, and only in doses approximately 30 times greater reduces the tonus of the nictitating membrane. Therefore, RGH 1106, just as pancuronium, in doses causing myorelaxation in cats does not display ganglion blocking properties.

RGH 1106 in doses up to 100  $\mu$ g/kg did not influence the negative chronotropic effect of acetylcholine and the depressor reaction caused by it (Fig. 3). The initial suppression (less than 20 percent) of "acetylcholinic" bradycardia was observed when RGH 1106 was used in doses of



200-500  $\mu\text{g/kg}$ , while the injection of 1.5-3 mg/kg of the preparation was required for complete suppression of the effect of acetylcholine on the heart. Even in such large doses, RGH 1106 did not evoke substantial changes in the hypotensive reaction to acetylcholine.

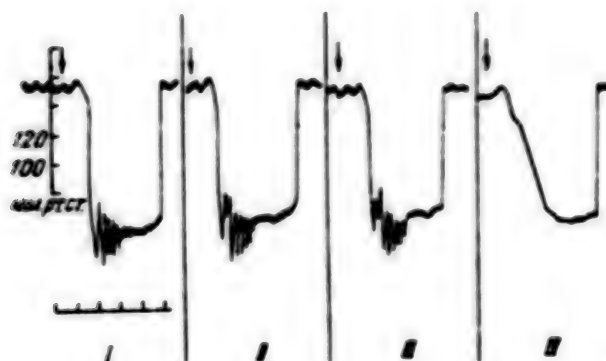


Figure 3. Effect of RGH 1106 and Pancuronium on Bradycardia and Hypotension Caused by Acetylcholine

I--12 hours and 45 minutes (before injection); II--13 hours (3 minutes after injection of RGH 1106 in a dose of 15  $\mu\text{g/kg}$ ); III--13 hours and 15 minutes (3 minutes after injection of RGH 1106 in a dose of 85  $\mu\text{g/kg}$ ); IV--13 hours and 30 minutes (3 minutes after injection of pancuronium in a dose of 100  $\mu\text{g/kg}$ ). Injection of acetylcholine (20  $\mu\text{g/kg}$  intravenously) is shown by the arrows. Calibration: one interval corresponds to 5 sec.

In contrast to RGH 1106, pancuronium in a myoparalytic dose already noticeably reduced the depressing effect of acetylcholine on the heart, and in doses of 100-200  $\mu\text{g/kg}$  practically suppressed it. At the same time, the pancuronium, just as RGH 1106, made almost no change in the hypotensive effect of the acetylcholine. These results to a considerable extent coincide with the data of Saxena and Bonta (1970), Hughes and Chapple (1976), who also confirm the presence of quite marked cardiotropic m-cholinolytic properties in pancuronium.

It is interesting to note that a similar effect is also typical of a number of other steroid myorelaxants--stercuronium, dacuronium, HS-342 and Org-6368, with these compounds, just as pancuronium, in doses close to myoparalytic, blocking the cardiac m-cholinoreceptors (Marschall, 1973; Sugrue and coauthors, 1975).

It must be emphasized that the suppressing effect with respect to the cardiac m-cholinoreceptors is regarded as a negative property of myorelaxants, since in clinical use these substances often cause tachycardia and may induce cardiac arrhythmia (Waltz and Prescott, 1965; Norman and Katz, 1971; Coleman and coauthors (1972).

Judging from the results of the present study, RGH 1106 in this respect has an advantage over pancuronium and other steroid myorelaxants, since the range between the dosages in which the preparation blocks the n-cholinergic structures of the skeletal muscles and the m-cholinergic receptors of the heart is quite a large one.

In evaluating the effect of RGH 1106 on coronary blood flow and the myocardial consumption of oxygen it was established that the myorelaxant in dosages of 15-60  $\mu\text{g/kg}$  exerts no essential influence on these parameters. There was also practically no change in the systemic arterial pressure and the rate of palpitation. Similar results were also obtained for pancuronium (25-100  $\mu\text{g/kg}$ ). Therefore, these data attest to the absence in RGH 1106 and pancuronium of any effect on the coronary vessels and oxidizing processes in the myocardium.

RGH 1106 and pancuronium in dosages up to 100  $\mu\text{g/kg}$  had no effect on the amplitude of the monosynaptic and area of the polysynaptic potentials of the spinal cord, nor on the time of the synaptic suppression and recovery cycles of the evoked potentials, nor was any effect of the preparations being studied noted on the magnitude of the single orders of the glossomaxillary reflex and amplitude of the primary responses in the somatosensory area of the cerebral cortex.

A study of the anticholinesterase properties of RGH 1106 showed that in concentrations of  $1 \cdot 10^{-7}$ - $1 \cdot 10^{-5}$  M the compound does not affect the activity of the acetylcholinesterase of the brain of rats. At the same time, with respect to the pseudocholinesterase of normal horse serum, a certain inhibiting effect was noted in the preparation: in concentrations in the order of  $1 \cdot 10^{-5}$  M RGH 1106 the activity of this enzyme was over 50 percent suppressed.

According to the data of Katz (1971), pancuronium has a similar spectrum of anticholinesterase action: it does not affect the acetylcholinesterase activity in vitro, but with respect to pseudocholinesterase displays a certain inhibiting activity. For example, in concentrations of  $2.3 \cdot 10^{-5}$  M, this myorelaxant suppresses by 50 percent the activity of the pseudocholinesterase of normal horse serum. Therefore, RGH 1106, analogously with pancuronium, has no antiacetylcholinesterase activity. The weak inhibiting action of this preparation with respect to pseudocholinesterase is of no essential importance, since it is detected only at concentrations considerably greater than those reached in the organism when the preparation is prescribed for the purposes of myorelaxation.

The studies made make it possible to draw the conclusion that RGH 1106 corresponds to pancuronium with respect to a number of properties. At the same time, the absence of cardiotropic m-cholinolytic properties and high curarelike activity of RGH 1106 are an undoubted advantage of the preparation over pancuronium and other steroid myorelaxants.

## Conclusions

1. According to the data from electromyography, RGH 1106 is an anti-depolarizing curarelike agent.
2. The comparative sensitivity of the synaptic structures of various groups of skeletal muscles to RGH 1106 is not identical: the most sensitive to the preparation are the musculus masseter and the muscles of the extremities, less sensitive--the diaphragm and abdominal muscles, and the least sensitive--the intercostal muscles.
3. In a myoparalytic dose, RGH 1106 has no ganglion blocking activity and no cardiotropic m-cholinolytic properties.
4. RGH 1106 does not affect the myocardial blood supply, its oxygen consumption or the synaptic stimulation in the spinal cord and the central units of the glossomaxillary reflex and magnitude of the primary responses of the somatosensory areas of the cerebral cortex, and displays no anti-acetylcholinesterase activity.

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COMPARISON OF THE EFFECT OF ACUTE HYPOXIA ON RAT LIVER LYOSOMAL APPARATUS AGAINST A BACKGROUND OF ADAPTATION TO HYPOXIA AND ADMINISTRATION OF GUTHIMIN

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian No 3, 1979 pp 294-298

[Article by A. B. Pupyshev, A. Ye. Malygin, O. R. Grek, Ye. G. Izyumov, T. V. Rusova and T. A. Korolenko, Department of Pharmacology (Head--Professor Ye. G. Izyumov) and Central Scientific Research Laboratory (Head--Professor G. S. Yakobson) of the Novosibirsk Medical Institute]

[Text] Acute hypobaric hypoxia of an organism (260 mm Hg col., 90 min.) does not cause reliable signs of labilization of the liver cell lysosomes, but results in an increase in the relative content of secondary lysosomes in the total liver lysosome population. The adaptation of rats to hypoxia and the abdominal administration of the antihypoxant guthimin and 1,4-bis (3'-morpholinopropin-1'-yl-1') benzene to a considerable extent prevent the effect of acute hypoxia on the lysosomal apparatus of the liver cells.

Tables--2. Illustrations--1. Bibliography--14 entries. FARNAKOL. I TOKSIKOL., No 3, 1979, p 294.

In the mechanism of the action of antihypoxants, a definite role is played by their ability to increase the resistance of the cell membrane structure. Preceding works showed the stabilizing action of guthimin and a number of unsaturated amines on the membrane structures of mitochondria (O. R. Grek and coauthors, 1967a, b). Probably no less important a unit in the formation of heightened resistance to hypoxia is the condition of the lysosomal membranes, the labilization of which results in the release of hydrolytic enzymes to the cytosol (A. A. Pokrovskiy and V. A. Tutel'yan, 1976).

In addition, the reaction of the liver cells to extremal conditions may be accompanied by a change in the population composition of the lysosome, depending on the functional state of the lysosomal apparatus. The increase in the relative number of secondary lysosomes may be traced through their heightened sensitivity to hypotonia (Deter and de Duve, 1967) and the increase in activity of the lysosomal enzymes in the "heavy" granular fractions enriched by the secondary lysosomes (A. Ye. Malygin and coauthors, 1976; Berg and Christoffersen, 1974).

The point of this work is to evaluate the state of the lysosomal apparatus of the liver in response to acute hypoxia of the organism in intact rats, with the adaptation of the animals to hypoxia, and under the conditions of a preliminary administration of the antihypoxant guthimin and stabilizer of the mitochondrial membranes 1,4-bis(3'-morpholinopropin'1'-yl-1') benzene (MPB).

**Methods of study.** The experiments were performed using 26 male Vistar rats with a mass of 300-350 g, which were divided into 8 groups: the 1st--the norm (intact rats); 2d--acute hypoxia: the animals were placed in a ventilated low-pressure chamber (230 mm Hg col.) for 90 minutes and were put to death 8-10 minutes after being removed from the pressure chamber (as in the rest of the experiments with acute hypoxia); 3d--adaptation to hypoxia: for 30 days the rats were placed in the pressure chamber (350 mm Hg col., which corresponds to a "height" of 6000 m) for 5-6 hours every day, and were put to death 24 hours after the last "elevation to the height"; 4th--adaptation to hypoxia + hypoxia: acute hypoxia (230 mm Hg col., 90 minutes) was induced in animals adapted to hypoxia; 5th--MPB (100 mg/kg) was administered intraperitoneally, and after 20 minutes the animals were put to death; 6th--guthimin (100 mg/kg) was injected intraperitoneally and the animals were put to death after 40 minutes; 7th--20 minutes after the administration of MPB the animals were placed in a pressure chamber (230 mm Hg col., 90 minutes); 8th--40 minutes after administering the guthimin the animals were placed in the pressure chamber (230 mm Hg col., 90 minutes).

After the rats were decapitated, the liver was removed and perfused with a cold solution of 0.25 M saccharose and 0 mmole of ethylenediaminetetraacetic acid, pH 7.4). Twenty-five percent of the liver homogenate in the same solution was fractionated by differential centrifuging (de Duve and coauthors, 1955), after preliminary removal of the cells not fully broken down (30 g, 10 minutes, twice). The subcellular fractions were separated out under the following conditions: nuclei--700 g, 13 minutes and again, 700 g, 8 minutes; heavy mitochondria--4000 g, 15 minutes; light mitochondria--13,500 g, 10 minutes; microsomes--105,000 g, 40 minutes. The sensitivity of the lysosomes to hypotonia was evaluated according to the increase in free activity of the lysosomal enzymes while maintaining the homogenate in the solution of 0.125 M of saccharose, 1 mM of ethylenediaminetetraacetic acid, pH 7.4, at 0-2°C for 30 minutes (Deter and de Duve, 1967). The activity of the acid RNase (creatine phosphate 3.1.4.23) and the acid phosphatase (creatine phosphate 3.1.3.2, substrata  $\beta$ -glycerophosphate) was determined according to Barrett's recommendations (1972). The reaction was stopped by the addition of 1 N HClO<sub>4</sub>. The inorganic phosphate was determined according to Fluke and Subbarow (1925). The overall activity of the enzymes was recorded after the preparations had been frozen and thawed 7 times. The protein was determined according to Lurie. The relative specific activity (QUA) of the enzymes represented the quotient from dividing the percent of activity of the enzyme in the fraction by the percent of protein (de Duve and coauthors, 1955). Student's criterion was used in the statistical processing of the results.



Table 1. Free Activity of Acid RNase and Acid Phosphatase and Increase in Free Activity of Enzymes in a Hypotonic Medium in the Homogenate of a Rat's Liver (M+m)

Группа животных (1)	Свободная активность, % от общей (2)		Прирост свободной активности в гипотонической среде, % от общей (5)	
	(3) кислота РНК-азы	(4) кислота фосфатаза	(3) кислота РНК-азы	(4) кислота фосфатаза
1-я — норма (6)	19,5±3,2	13,1±0,4	28,4±4,0	10,6±0,9
2-я — гипоксия (7)	13,5±1,4	11,6±1,5	60,3±4,0	18,5±2,4
$P_{1-2}$			<0,05	<0,05
3-я — адаптация к гипоксии* (8)	14,1	7,3	45,0	5,4
4-я — адаптация к гипоксии + гипоксия (9)	7,4±0,9	12,3	11,8±2,4	23,3
$P_{1-4}$	<0,05		<0,05	
$P_{3-4}$	<0,05		<0,05	
5-я — МПБ* (10)	13,0	8,3	19,6	9,7
6-я — гутимин* (11)	9,8	8,6	21,6	16,7
7-я — МПБ + гипоксия (12)	9,8±4,6	8,8±0,5	32,9±4,5	12,9±0,4
$P_{1-7}$		<0,05		
8-я — гутимин + гипоксия (13)	12,2±1,2	8,6±0,5	24,9±4,1	13,0±1,4
$P_{1-8}$	<0,05	<0,05		

\* The averages of 2 measurements are given

Note: Here and in Table 2: MPB--1,4-bis (3'-morpholinopropin'1'-yl'1') benzene.

Key:

1. Group of animals
2. Free activity, in % of total
3. Acid RNase
4. Acid phosphatase
5. Increase in free activity in hypotonic medium, in % of total
6. Norm
7. Hypoxia
8. Adaptation to hypoxia\*
9. Adaptation to hypoxia + hypoxia
10. MPB\*
11. Guthimin\*
12. MPB + hypoxia
13. Guthimin + hypoxia



Table 2. Subcellular Distribution of Protein, Acid RNase and Acid Phosphatase in Hypoxia and Use of Guthimin and MPB (H+m) or (M)

(1) Группа животных	(2) Показатель	(3) Субклеточные фракции				Растворимая активность лизосомальных ферментов (8)
		(4) ядр	(5) тяжелые митохондрии	(6) легкие митохондрии	(7) микросомы	
(12) Я-норма	Белок (9)	15.2±2.6	41.2±3.3	5.5±0.2	21.2±0.5	16.9±1.5
	РНК-аза (10)	8.7±1.9	49.7±2.1	24.5±0.9	15.4±1.6	2.0±0.3
	КФ (11)	7.7±2.1	30.7±1.1	19.8±3.1	38.4±2.1	3.2±0.5
(13) Я-гипоксия	Белок (9)	21.6±3.3	35.9±3.7	8.9±0.5	15.4±0.2	20.7±1.8
	РНК-аза (10)	21.2±3.3	37.9±0.7	27.2±3.0	11.1±0.7	2.4±0.3
	КФ (11)	20.9±1.8	33.7±1.6	25.6±3.9	14.8±2.9	5.1±1.2
(14) 3-я — адаптация к гипоксии*	Белок (9)	15.8	36.0	2.1	20.8	27.0
	РНК-аза (10)	14.0	33.7	15.1	35.1	1.6
	КФ (11)	21.0	30.6	20.3	25.4	2.7
(15) 4-я — адаптация к гипоксии + гипоксия	Белок (9)	15.2±0.9	35.2±1.9	10.5±1.1	16.9±0.7	22.2±0.6
	РНК-аза (10)	10.4±1.6	39.2±1.6	36.8±2.2	9.1±0.9	7.6±0.9
	КФ (11)	9.4	31.2	34.7	16.3	8.5
(16) 5-я — МПБ*	Белок (9)	21.4	32.2	4.2	18.1	24.2
	РНК-аза (10)	16.0	42.0	17.2	23.2	1.6
	КФ (11)	15.3	37.5	17.6	25.7	4.1
(17) 6-я — гутимин*	Белок (9)	11.5	42.3	4.6	17.4	24.2
	РНК-аза (10)	10.3	53.8	20.6	14.6	2.8
	КФ (11)	7.1	47.2	22.6	20.0	3.3
(18) 7-я — МПБ + гипоксия	Белок (9)	21.8±2.0	36.9±1.6	7.0±0.4	15.1±1.0	19.1±1.0
	РНК-аза (10)	18.6±1.4	44.8±3.3	21.0±1.7	13.8±2.7	1.8±0.3
	КФ (11)	15.1±1.3	36.9±3.1	28.5±2.2	15.5±2.4	4.0±0.5
(19) 8-я — гутимин + гипоксия	Белок (9)	16.3±0.5	42.6±1.6	6.5±0.2	14.7±0.9	19.8±0.5
	РНК-аза (10)	17.9±0.7	50.8±0.7	20.5±1.7	8.7±0.4	2.1±0.6
	КФ (11)	12.5±0.5	39.3±2.6	29.5±2.1	13.8±1.6	3.6±0.3

\* Averages made from 2 measurements

Notes. 1. Indicators given in percents of the sum of all the fractions.  
2. KF--acid phosphatase

Key:

- |  |                                     |
|--|-------------------------------------|
| 1. Group of animals                      | 15. Adaptation to hypoxia + hypoxia |
| 2. Indicator                             | 16. MPB*                            |
| 3. Subcellular fractions                 | 17. Guthimin*                       |
| 4. Nuclei                                | 18. MPB + hypoxia                   |
| 5. Heavy mitochondria                    | 19. Guthimin + hypoxia              |
| 6. Light mitochondria                    |                                     |
| 7. Microsomes                            |                                     |
| 8. Soluble activity of lysosomal enzymes |                                     |
| 9. Protein                               |                                     |
| 10. RNase                                |                                     |
| 11. KF                                   |                                     |
| 12. Norm                                 |                                     |
| 13. Hypoxia                              |                                     |
| 14. Adaptation to hypoxia*               |                                     |

Results and their discussion. In the first group (norm), the values obtained for the free activity of the enzymes as measures of the intactness of the lysosomal membranes are 13.1 percent for acid phosphatase and 19.3 percent for acid RNase (Table 1), which corresponds to the data from the literature (Deter and de Duve, 1967). The increase in the free activity of the enzymes in the hypotonic solution of the saccharose, which conditionally corresponds to the initial (control) ratio between the secondary and primary lysosomes, is 28.4 percent for RNase and 10.6 percent for acid phosphatase. The differences in the figures for the RNase and acid phosphatase may be related to the fermentative and, apparently, to the physical-chemical heterogeneity of the lysosomes of the liver cells (Shtraus, 1971; Berg and Boman, 1973).

In the second group (hypoxia), as compared with the first free (see Table 1) and nonsedimentational, or soluble (Table 2), the activity of the lysosomal enzymes changes negligibly, i.e., no reliable signs of labilization of the lysosomal membranes are detected. The researchers who detected the labilizing effect of hypoxia on lysosomes (Loefering and coauthors, 1975); Galvin and Lefer, 1977) used smaller amounts of  $PO_2$ . The sensitivity of the lysosomes of the homogenate to hypotonia approximately doubles (see Table 1), which, taken together with the increase in the percentage of activity (see Table 2) and relative specific activity (see diagram) of the lysosomal enzymes in the fraction of the nuclei, indicates an increase in the proportion of secondary lysosomes in the total population of the liver lysosomes. In comparison with the inflammatory reaction of the liver in the model of  $CCl_4$ -hepatitis (T. A. Korolenko and coauthors, 1975), no characteristic rise in the relative specific activity of the lysosomal enzymes was detected in the fraction of heavy mitochondria, but in the fraction of light mitochondria a reduction in the relative specific activity of the enzymes to approximately 3.0 (see diagram), typical for hepatitis, was detected with an increase in the relative protein content from 5.5 to 8.9 percent (see Table 2).

In the third group (adaptation to hypoxia), the amounts of free activity of the enzymes did not differ essentially from those given in the second group (see Table 1). The sensitivity of the lysosomes to hypotonia was at the level of the values in the intact animals. A reduction in the protein content in the fraction of light mitochondria (from 5.5 to 2.2 percent--see Table 2) and an increase in activity (see Table 2) and the relative specific activity (see diagram) of the enzymes in the fraction of microsomes, which may be regarded as the result of inducing primary lysosomes (A. Ye. Malygin and coauthors, 1976; Shtraus, 1971) may be regarded as signs of the liver's adaptation to hypoxia.

In the fourth group (adaptation to hypoxia + hypoxia), the free activity of the RNase (see Table 1) definitely diminished as compared with the first and second groups of animals, and of the acid phosphatase--did not change. Apparently, in this case one may speak only of a tendency toward stabilization of the lysosome content as compared with the first and second groups, since the soluble activity of the enzymes (see Table 2) rose and reached

approximately 8 percent. The proportion of secondary lysosomes apparently did not increase, since no redistribution of the lysosomal enzymes into "heavy" granular fractions--of the nuclei and heavy mitochondria (see Table 2) was revealed--and with respect to the RNase there was no increase in sensitivity of the lysosomes of the homogenate to hypotonia, as compared with the first and second groups (see Table 1). Among the signs of subcellular pathology may be included the heightened (to 10 percent--see Table 2) protein content in the fraction of light mitochondria, as the result of which the relative specific activity of the enzymes in the fraction was reduced to 3.2-3.5.

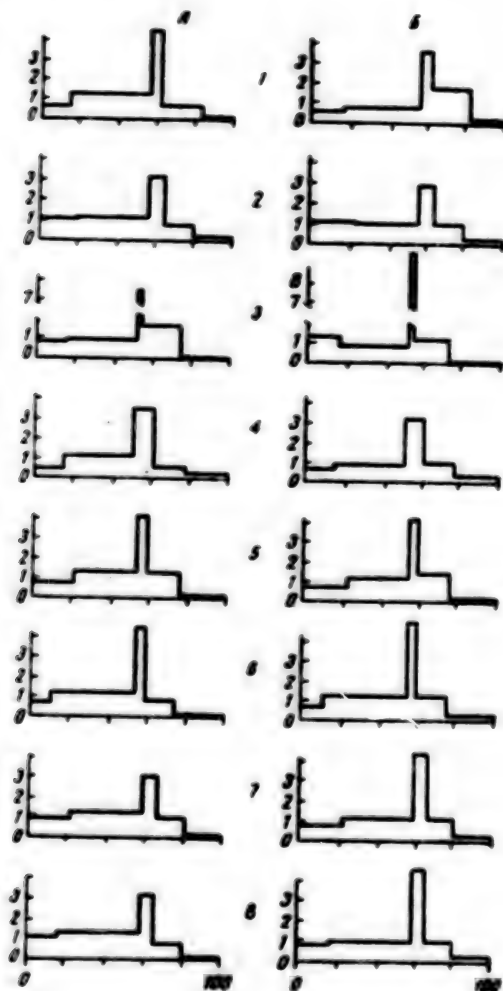
In the fifth group (MPB), as compared with the first, the free activity of the enzymes of the liver homogenate and its growth in a hypotonic medium decreased, i.e., the preparation showed signs of stabilization of the lysosome membranes. No essential effect on the subcellular distribution of the lysosomal enzymes was detected, with the exception of a certain redistribution of the protein and activity of the enzymes from the fraction of the nuclei to the fraction of heavy mitochondria (Table 2) and a high concentration of enzymes in the microsome fraction (relative specific activity--1.3-1.4, see diagram). This, as in the case of rats' adaptation to hypoxia, we relate to the induction of the primary lysosomes.

Guthimin (sixth group) affects the stability of the lysosomes in a manner similar to the MPB preparation. In this case the subcellular distribution of protein and enzymes is close to the norm.

The administration of MPB and subsequent acute hypoxia (seventh group), as compared with the "pure" acute hypoxia, had a certain stabilizing effect on the lysosomes of the liver homogenate (free activity of the enzymes--see Table 1), and removed the signs of heightened sensitivity of the lysosomes to hypotonia, returning this indicator to the norm (see Table 1). The latter result is apparently connected not only with the general stabilization of the lysosomal membrane, but also with normalization of the population composition of the lysosomes, since there is a noticeable reduction in the effect of the hypoxia with respect to the redistribution of activity of the lysosomal enzymes in the fraction of the nuclei (see Table 2 and diagram). A comparison of the rest of the indicators of the subcellular distribution with the data obtained in the first, second and third groups reveals their similarity to the indicators of the second group of rats and does not permit singling out additional substantial signs of similarity in the mechanism of the antihypoxic effect of the preparation and adaptation to hypoxia with respect to the liver lysosomes.

In the eighth group (guthimin + hypoxia), as compared with the preceding state of the lysosomal apparatus of the liver, there was no substantial difference in the free activity of the enzymes nor in the sensitivity of the lysosomes to hypotonia. The subcellular distribution of protein and enzymes, as in the seventh group, did not completely return to the norm. The differences in the effect of guthimin and MPB amounted to a certain inducing

effect of the latter on the formation of primary lysosomes. This was expressed in the higher percentage of activity (see Table 2) and relative specific activity (see diagram) of the enzymes in the fraction of the microsomes with both the "pure" administration of the preparations and with the subsequent hypoxia.



#### Enrichment of the Subcellular Fractions of the Liver Homogenate of Rats With Acid RNase and Acid Phosphatase

Along the axis of the abscissa--relative protein content in subcellular fractions (in % of content in all fractions); along the axis of ordinates--relative specific activity of enzymes in the fractions (in units). A--acid RNase; B--acid phosphatase. 1--norm; 2--hypoxia; 3--adaptation to hypoxia; 4--adaptation to hypoxia + hypoxia; 5--1,4-bis(3'-morpholinopropin-1'-yl-1') benzene (MPB); 6--guthimin; 7--MPB + hypoxia; 8--guthimin + hypoxia. Subcellular fractions are arranged from left to right in order of deposit (fraction of nuclei, heavy mitochondria, light mitochondria, microsomes, soluble fraction).

## Conclusions

1. Hypobaric hypoxia of the organism of a rat (260 mm Hg col., 90 minutes) does not cause substantial labilization of the membranes of the liver lysosomes.
2. Hypoxia is accompanied by a change in the osmotic and sedimentation properties of the liver lysosomes, which attests to an increase in the relative content of secondary lysosomes, possibly of the autophagic series.
3. Adaptation of rats to hypoxia and the administration of guthimin and 1,4-bis(3'-morpholinopropinyl-1') benzene have a normalizing effect on the state of the lysosomal apparatus of the liver in response to hypoxia, but do not prevent all the subcellular manifestations of the effect of hypoxia on the liver.

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TOXICOPHARMACOLOGICAL CHARACTERISTICS OF CERTAIN HOMOLOGUES OF ARMINE AND NIBUFIN

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian No 3, 1979 pp 299-301

[Article by V. I. Leonov, Department of Pharmacology (Head--Professor I. V. Zaikonnikova) of the Kazan Medical Institute imeni S. V. Kurashov]

[Text] It was shown that introducing butyl radicals into molecules of derivatives of phosphonic and phosphinic acids reduces their toxicity and at the same time, the anticholinesterase activity and other pharmacological properties change, depending on the localization of the butyl radicals.

Tables--1. Bibliography--5 entries. FARMAKOL. I TOKSIKOL., No 3, 1979, p 299.

Homologues of armine and nibufin--butyl paranitrophenyl ester of ethylphosphonic acid (preparation No 94), ethyl paranitrophenyl ester of butylphosphonic acid (preparation No 1326), butyl paranitrophenyl ester of butylphosphonic acid (preparation No 1445) and paranitrophenyl ester of diethylphosphinic acid (preparation No 131)--were synthesized, just as armine and nibufin, at the Department of Organic Chemistry imeni A. Ye. Arbuzov of the Kazan Institute of Chemical Technology, under the direction of Professor A. I. Razumov and Lecturer O. A. Mukhacheva.

This work is devoted to an experimental toxicopharmacological study of these compounds.

Methods of investigation. The general effect and toxicity were studied using 200 white mice in acute and chronic experiments. Preparations No 94, 1326 and 131 were administered subcutaneously, and preparation No 1445, in view of its poor solubility in water--intravenously. The average lethal doses were determined according to Behrens. For repeated (over a period of 30 days) administration of the preparations in the DMT [maximum effective tolerance] dose, 40 white mice with a mass of 17-25 g were used.



Anticholinesterase properties were determined in vitro according to Hestrin (1949). The blood serum and homogenate of the cerebral cortex of rabbits served as the sources of the cholinesterase. The detoxication rate of the compounds in the animals' organism was determined from the number of mice remaining alive after divided administration of absolutely lethal doses for certain periods of time. The effect of the preparations on isolated segments of the small intestine of a rabbit was studied (Magnus, 1904). A study was made on the eyes of 12 rabbits of the effect of the compounds on the size of the pupil, with determination of the maximally and minimally active concentrations.

The ability of the organophosphorus compounds to potentiate the action of the substances suppressing the central nervous system was estimated from the reaction with chloral hydrate (350 mg/kg), Hexenal (60 mg/kg), urethane (1.5 g/kg), ethyl alcohol (4 g/kg) and Aminazine (7.5 mg/kg). Antagonism with phenamine was judged from the ability of the substances to protect the grouped white mice from death when the phenamine was administered (the experiment was performed on 60 animals, and the preparations were injected in doses of 1/10 the DMT 15 minutes before the administration of the phenamine), and also from the effect on the phenamine stereotype (the experiment was performed on 60 rats and the preparations were administered subcutaneously in the same doses as when the "group" toxicity of the phenamine was determined).

Experiments on 24 rats, using the fluorescent-analytic method of E. Sh. Matlina and T. B. Rakhmanova (1974) with an EF-3M instrument determined the amount of adrenalin and noradrenalin in the brain tissue of rats to whom the compounds being studied had been administered in DMT doses 1 hour before being put to death.

A study was made on 120 white mice of the reaction of the preparations with cholinolytic agents--atropine (30 mg/kg), aprolidine (30 mg/kg), spasmolytin (30 mg/kg) and aprophen (100 mg/kg). The cholinolytics were used before and after administration of absolute lethal doses of the preparations. The protective properties of the cholinolytic agents were judged according to the number of animals remaining alive.

Using the method of V. V. Zakusov (1933) and G. A. Mednikyan (1938), a study was made of the effect of the preparations on the respiration and arterial pressure of 20 rabbits (urethane anesthesia--1.5 g/kg). The preparations were injected intravenously in a dose of 0.1 mg/kg.

A study was made on 8 rabbits of the effect of the compounds on the intestines under the conditions of an intact organism, using the Nikolayev-Subbotin method (the preparations were injected intramuscularly in doses of 0.1-0.5 mg/kg).

Toxicity of Preparations For White Mice (P=0.05)

(1) Препарат	(2) Формула	(3) Доза, мг/кг					
		DMT		DL <sub>50</sub> (6)		DL <sub>100</sub> (7)	
		(4) подкожно	(5) внутривенно	(4) подкожно	(5) внутривенно	(4) подкожно	(5) внутривенно
(8) Армин		0.17	0.13	0.33 (0.29+0.37)	0.25 (0.21+0.29)	0.5	0.33
№ 94		1.25	0.75	1.6 (1.3+1.7)	1.3 (1.2+1.4)	1.75	1.6
№ 1326		1.0	0.75	1.2 (1.1+1.3)	1.0 (0.89+1.12)	1.75	1.25
№ 1445		—	4.0	—	4.9 (4.2+5.6)	—	7.0
(9) Нибуфин		4.95	2.5	7.2 (5.4+10.0)	4.8 (4.3+5.3)	11.5	8.25
№ 131		2.0	2.5	3.4 (2.7+4.0)	3.35 (2.95+3.75)	8.0	4.5

Key:

1. Preparation
2. Formula
3. Dose, in mg/kg
4. Subcutaneously
5. Intravenously
6. MLD<sub>50</sub>
7. MLD<sub>100</sub>
8. Armine
9. Nibufin

The data obtained were processed statistically by the method of indirect differences, as well as with the aid of (Genes) tables.

**Results and their discussion.** All the compounds caused cholinergic stimulation. The death of the animals occurred due to the cessation of respiration against a background of bronchospasm after 15-45 minutes with subcutaneous, and after 1-5 minutes with intravenous injection.

The toxicity of the substances lay in their direct relation to their chemical structure (see table). Introducing butyl radicals into the composition of the compounds reduced the toxicity. Under the conditions of daily administration of the preparations studied to the mice for 30 days, according to the data from the control for diuresis, no capacity of the compounds to accumulate in the animals' organism was revealed. The detoxication rate of the preparations was 6 hours, and for armine--36 hours, for nibufin--18 hours.

All the compounds showed anticholinesterase activity in vitro and inhibited acetylcholinesterase more strongly than butyrylcholinesterase. As it turned out, introducing butyl radicals into molecules of armine homologues reduced the anticholinesterase activity. The cholinesterase was maximally inhibited by preparation No 94. An opposite relation was observed in the derivatives of dialkyl esters of phosphinic acid: substitution of butyl radicals in the nibufin for ethyl radicals in preparation No 131 substantially reduced the latter's ability to inhibit cholinesterase.

With respect to the effect on the isolated segment of the rabbit's intestine, preparation No 1326 proved to be the most active (minimally effective concentration-- $2 \cdot 10^{-8}$  M), and the weakest--preparations Nos 131 and 94 ( $2 \cdot 10^{-7}$  M). Consequently, in the derivatives of the armine series, the key point with respect to the effect on the isolated intestine is the presence of the ethyl radical in the ester part of the molecule. For preparation No 131, the homologue of nibufin, on the contrary, the administration of ethyl radicals reduced the compound's activity. Atropine ( $10^{-6}$  M), just as papaverine ( $10^{-5}$  M) and spasmolytin ( $10^{-4}$  M), completely removed and prevented the action of the preparations on the unstriated musculature of the intestines. The ganglionic blocking agent hexamethonium ( $5 \cdot 10^{-4}$  M) to a considerable extent removed and prevented the effect of preparations Nos 1326 and 1445, but the preventative effect for the latter was less marked. All the preparations had an effect on the intestines against a background of calcium chloride ( $2.5 \cdot 10^{-3}$  M) and novocaine ( $10^{-5}$  M). The direct influence of the substances on the unstriated musculature was revealed.

The strongest miotic effect was exerted by preparation No 94.

All the compounds tested potentiated the action of the substances suppressing the central nervous system. The strongest effect was exerted by preparations Nos 1326 and 1445, which prolonged the effect of chloral hydrate 5 1/2- to 15 1/2 fold, of urethane 6-10-fold, and of aminazine--2.2-10-fold ( $P=0.01$ ). Preparation No 94 acted more weakly, but more markedly than armine ( $P=0.01$ ).

The studies made did not reveal any significant effect of the compounds on tests of the phenamine stereotype and "group" toxicity of the phenamine. A study of the effect of the preparations on catecholamine exchange in the brain tissue of rats also showed no reliable changes.

Atropine proved to be an effective antagonist for preparations Nos 94 and 1445, and aprolidine--of preparation No 1326. These cholinolytics, in 80-100 percent of the cases, prevented the death of the mice when the preparations were administered in lethal doses ( $P=0.01$ ). It is known that atropine is a more effective antidote for armine, and aprolidine--for nibufin.

The organophosphorus compounds studied did not exert a marked effect on the arterial pressure and respiration or on the intestinal functions of the rabbit under conditions of an intact organism.

#### Conclusions

1. Alkyl derivatives of phosphonic and phosphinic acids possess anti-cholinesterase activity.
2. Introducing butyl radicals into the molecules of phosphonic acid derivatives reduces their toxicity and somewhat reduces the anti-cholinesterase activity.
3. All the compounds have a suppressive effect on the central nervous system.
4. Two preparations were revealed--butyl paranitrophenyl ester of ethylphosphonic acid (No 94) and butyl paranitrophenyl ester of butylphosphonic acid (No 1445)--that have properties similar to armine and nibufin, but are less toxic.

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PROMISING FUNGICIDES FOR PROTECTION OF PLANTS AGAINST DISEASES

Leningrad NIKOLOGIYA I FITOPATOLOGIYA in Russian No 2, 1979 pp 89-94

[Article by Ye. I. Andreyeva, Institute of Chemicals for Plant Protection, Moscow, submitted 14 Oct 78]

[Text] The July 1978 plenum of the CC CPSU outlined the routes for further increase in productivity of the main agricultural crops. Control of pests, diseases and weeds is very important to obtaining stable harvests. According to the data of the FAO (Food and Agricultural Organization of WHO), losses due to deleterious organisms constitute 30% of the overall annual agricultural product (Faddeyev, Novozhilov, 1978). At the present time, the chemical method plays the leading role in protecting plants against diseases, and this trend will persist for the next 20-30 years. The success and effectiveness of this method depend on proper formation and selection of the assortment of fungicides and bactericides recommended for the control of plant diseases. Fungicides referable to different classes of chemical compounds are used in worldwide practice. By 1980, fungicides totaling a cost of 1382 million dollars will be produced, versus 961 million dollars in 1974 (Mel'nikov, 1978). A promising assortment of fungicides is being produced in the USSR on the basis of the advances in modern science and practice, both in our country and abroad. The importance of the crop to be protected, the specifics and biological distinctions of the pathogen, its sensitivity to chemicals, technical efficacy of the method, toxicity to warm-blooded animals and effect on the environment are the first considerations. Attention is being given to the use of mixtures of fungicides with other pesticides, antibiotics, growth factors, fertilizers, etc. Fungicides with different mechanisms of action, as well as mixtures thereof, which were developed on the basis of synergism and broader spectrum of action, are included in the assortment in order to prevent development of pathogen resistance to fungicides. Fungicides with selective action, which can depress development of pathogens without harming useful microorganisms and without altering the existing biocenotic equilibrium, are also included. Both in the USSR and abroad, attention is concentrated on similar classes of compounds in obtaining an assortment of fungicides.

With regard to inorganic products, there will be continued use of agents containing copper, including copper oxychloride (COC) and sulfur oxychloride.



The 80% copper oxychloride (LD<sub>50</sub> 470 mg/kg) in 0.3% concentration is used to control Pseudoecysiphaceae fungi, including treatment of potatoes against phytophthora infection, grapes against mildew, tobacco against peronosporosis, vegetables and other crops. Among the inorganic sulfur products, 80% wetting power (WP) and ground sulfur, which are recommended to protect plants against powdery mildew, have been retained in the assortment.

Dithiocarbamates will continue to be in the lead, with regard to production and use in the USSR, under the Tenth and subsequent five-year plans.

At the present time, our industry produces 80% zineb (zinc ethylene bis-dithiocarbamate, LD<sub>50</sub> 5200 mg/kg). Zineb, in concentrations of 0.3-0.5%, is active against fruit scab, phytophthora infection of potatoes and tomatoes, pseudo-powdery mildew of hops and sugar beets, peach leaf curl, drupe blight and many other pathogens. Zineb does not depress real powdery mildew, and in a number of instances some enhancement of oidium development in vineyards is observed with prolonged use of zineb. In such cases, zineb treatment is alternated with sulfur-containing fungicides. Zineb is used with COC in order to widen its spectrum. The combined product, cuprosan, was developed on the basis of the latter; it contains 65% COC and 15% zineb. In an 0.5% concentration, this product is recommended for treatment of plants against a set of diseases of vegetable, cucurbitaceous, fruit and other plants.

Under the Tenth Five-Year Plan, serial production is scheduled of two other agents of this group, polycarbacin and polymarcin; 80% polycarbacin WP is a contact action fungicide, which contains zinc ethylene bis-dithiocarbamate (n) and ethylene bis-thiuram disulfide (m) (n:m, 1:3); the LD<sub>50</sub> is 6100 mg/kg. This product is recommended for the control of diseases of fruit trees, vegetables, grain and other crops (2-15 kg/ha). To protect apple trees against scab, polycarbacin is used in an 0.5% concentration. The trees are treated several times, depending on the stage of development of the disease, season and age of the tree, it being sprayed for the first time at the stage of differentiation of buds, when they turn pink in color; the interval between treatments is 10-12 days. Polycarbacin is used in the same concentration, at the budding stage, against phytophthora infection of potatoes and tomatoes, and treatment is then repeated several times at 10-15 day intervals. This product is recommended in an 0.3% concentration for the control of cercospora leaf spot and peronosporosis of sugar beets. The first treatment is administered when the first signs of disease appear, then repeated 3-4 times in the course of the season, depending on the degree of disease development. Polycarbacin treatment is discontinued 30 days before harvesting of most crops. A combined agent, polykhom [poly-COC], was developed on the basis of polycarbacin and copper oxychloride (65% polycarbacin and 15% COC). This product has a broader spectrum of action than each of the components separately. In an 0.4% concentration, polykhom is recommended for the protection of fruit plants against scab and other diseases, as well as to control phytophthora infection of potatoes and tomatoes; it is recommended, in an 0.2-0.3% concentration, for the protection of sugar beets against a set of pathogens of leaf diseases.



The 75% polymarcin WP contains zinc and manganese ethylene bis-dithiocarbamate with ethylene thiuram disulfide (LD<sub>50</sub> 3200 mg/kg). This product has high contact activity against phytophthora infection of potatoes, and it is more effective than the first two products in this group. It is used in 0.3-0.4% concentrations. In the USSR, 50% euparen [N',N'-dimethyl-N'-phenyl)-(N-fluorodichloromethylthio)-sulfamide], LD<sub>50</sub> 820-3700 mg/kg, is recommended for the control of gray rot of grapevines. The product is harmless to bees. In concentrations of 0.1-0.2%, euparen is used in vineyards prior to blooming; in addition to gray rot, it depresses development of oidium and grapevine mildew. Treatment of vineyards with this product is discontinued 30 days prior to harvesting. It is also active against gray rot of strawberries, and treatment of the latter is stopped 15 days prior to harvesting.

Among the fungicides of the phthalimide group used in the Soviet Union, kaptan and phthalan are very active. A 50% kaptan WP (1-trichloromethylthiotetrahydrophthalimide, LD<sub>50</sub> 9000-15,000 mg/kg) is a protective contact fungicide, which is recommended for the control of plant diseases induced by pseudoerysiphaceae fungi, as a substitute for Bordeaux mixture. It is used in concentrations of 0.3-0.5% and standard dosage is 1.5-10 kg/ha. It depresses grapevine mildew, phytophthora infection of potatoes and tomatoes, apple tree scab and many other diseases of vegetable, flower and berry crops. It is highly active against diseases of vegetables, cucurbitaceous and flowering crops when used as seed treatment, depressing microflora, including development of fungi of the genera *Aspergillus*, *Penicillium*, *Fusarium* and *Alternaria*.

The 50% phthalan (1-trichloromethylmercaptophthalimide, LD<sub>50</sub> 10,000 mg/kg) WP is similar to kaptan in chemistry and spectrum of action. Kaptan and phthalan treatment is discontinued 20 days before harvesting time. In the Soviet Union, 40% karatan (2,4-dinitro-6-sec-methylheptyl phenylcrotonate, LD<sub>50</sub> 980 mg/kg) has been tested with good results; it was developed by the Rom und Haas Firm (FRG).

Karatan is recommended for the control of true powdery mildew of cucumbers, apple trees, gooseberries, strawberries, grapevines in doses of 1 to 3 kg/ha. It has acaricidal action. Karatan, which has a different mechanism of action than benzimidazoles and other fungicides recommended for the control of powdery mildew fungi, is of interest for use in the system of protection of plants against the above pathogens, since it prevents development of resistance in the most dangerous pathogens. Treatment of plants with karatan is discontinued 20 days prior to harvesting in open ground and 2 days before harvesting in hothouses; but cucumbers and other vegetables must be washed thoroughly in water prior to consumption.

The Soviet industry plans to produce the product, PDN [FDN]. The 50% PDN (N,N-dimethyl-N-metachlorophenylguanidine, LD<sub>50</sub> 420 mg/kg) is recommended for protection of cucurbitaceae in open and closed ground against powdery mildew, and it is used in a concentration of 0.05%. It has protective

and exterminating action. It is active against other powdery mildew fungi (on grain plants and shrubs) in higher concentrations, but is inferior to karatan, benzimidazole and topsin preparations.

A 50% emulsifying ricid concentrate is recommended for the control of piriculariosis (?) of rice; its active component is 0,0-diethyl-S-benzyl thiophosphate, LD<sub>50</sub> 237 mg/kg. The product is recommended, in concentrations of 0.06-0.12, for treatment of rice against piriculariosis in all rice-growing regions. Ricid, like many other organophosphorus fungicides, is rapidly decomposed in the environment, and it presents no hazard to other organisms.

Along with the traditional contact fungicides, those referable to derivatives of benzimidazole, which have systemic activity, have also gained wide use in practice. In our country, benzimidazole derivatives have also been tested extensively, and they are recommended for use. There are essentially two groups of benzimidazole derivatives with high fungicidal properties. The first group, in which heterocyclic rings have a hydrocarbon bond, includes thiabendazole and furidazole. Thiabendazole is recommended for the control of many pathogens, particularly those of diseases of potatoes and sugar beets during the period of storage of sowing material. In the second group of benzimidazole derivatives, the ones that are best known in the USSR have heterocyclic rings bound through nitrogen with the ether group. This group includes the products, BMK (methyl benzimidazole carbamate) and benomyl [methyl ether-1-(butylcarbamoyl)-(benzimidazole carbamate)]. Mainly wetting powders have been developed in worldwide practice, which are based on the active ingredients. The LD<sub>50</sub> of the most toxic one, fuberidazole, is 825 mg/kg. LD<sub>50</sub> constitutes 3500 and 9590 mg/kg for BMK and benomyl, respectively. They do not have chronic toxicity. Thiabendazole, benomyl, BMK and analogues of the latter--carbendazim (BASF Firm, FRG), darosal (Hechst Firm, FRG), as well as fundazole, which is a benomyl analogue (Hungarian People's Republic) have an analogous spectrum of action. They are active primarily against fungi of the Ascomycetes and Deuteromycetes classes, but inactive against those referable to Oomycetes and Zygomycetes (Kirby, 1978; Edgington, Barron, 1971; Greenway, Whatley, 1976).

Many of them are used in the Soviet Union, in hothouses and open fields, against powdery mildew of cucumbers. They are also active against powdery mildew and scab of apple and pear trees, powdery mildew and cercospora leaf spot of sugar beets, gray rot of grapes, strawberries, raspberries and other plants, against rot of citrus and fruit plants during storage, depressing development of fungi of the genera *Penicillium*, *Aspergillus* and others. In a concentration of 0.05%, they have preventive and exterminative systemic action. Benzimidazoles have a systemic action not only when used to treat vegetating plants, but also when used to treat soil and seeds. Benomyl and BMK are active against wilt of cotton, strawberries, raspberries and other plants, as well as against smut of barley and wheat (Andreyeva, Kabakhidze, 1973). Topsin [1,2-bis-(3-methoxycarbamoyl-2-thiuredobenzene)], proposed by the Nippon Soda Company of Japan, has a spectrum of action that is similar to that of benzimidazole derivatives. Topsin, like benomyl, is

is hydrolyzed in aqueous media, plants and soil, with formation of BMK, which confirms that they have the same mechanism and spectrum of action. A positive correlation between in vitro and in vivo experiments referable to the same pathogen is not always confirmed in topsin and benzimidazole products. In experiments we conducted under laboratory conditions, benomyl for example did not depress sporulation of *Ustilago tritici*, but in the field there was complete depression of this pathogen. As compared to contact fungicides, the advantage of topsin, benomyl and BMK is that there is no need for uniform coverage of the entire treated surface, by virtue of their rapid penetration into tissues; their activity is unrelated to weather conditions and they have a longer protective action. However, because of the specific mechanism of action of these groups of systemic fungicides (they depress primarily biosynthesis), many fungi sensitive to these agents rapidly develop resistance. Pathogens with a high degree of sporulating activity, species of the genera *Botrytis*, *Erysiphe* and *Cercospora*, adapt to them particularly rapidly. For this reason, in spite of their high fungicidal properties, the systemic fungicides BMK, benomyl and topsin are used little for practical purposes, especially as compared to dithiocarbamates (Andreyeva, 1978). BMK, benomyl, topsin and other products of these groups are combined with other fungicides in order to prevent development of fungal resistance and broaden the spectrum of their action. The Rohm and Haas Firm has produced a product, epidor, which contains 10% benomyl and 64% mankoceb; the Nippon Soda Company has developed khomay, which contains topsin and TMTD [tetramethylthiuram disulfide]. Combined fungicides based on the above-mentioned mixtures are also being developed in the Soviet Union.

With reference to the group of pyrimidine products, agents manufactured by the Ay-Si-Ay [ICI] Company have been tested in the USSR with good results: etirimol (5-butyl-2-dimethylamino-6-hydroxy-4-methylpyrimidine), which is recommended for seed treatment to control powdery mildew of wheat and barley, and another form thereof, 28% emulsifiable concentrate of milgo E, which is recommended for use as a grain crop spray, also against powdery mildew. More recently, this company has developed a new product of the pyrimidine class, nimrod (bupyrimate), which is a 28% emulsifiable concentrate or wetting powder containing 5-butyl-2-ethylamino-6-methylpyrimidine-4-yl-dimethylsulfomate as the active ingredient, and its LD<sub>50</sub> is 4000 mg/kg. In doses of 75-250 mg/liter, it is active against powdery mildew of apple and pear trees, berries, roses, grain crops, vegetables and sugar beets. It has systemic protective and exterminative action. Nimrod depresses sporulation of pathogens; it has contact and fumigating activity; it is safe to the treated plants. No resistant strains of fungi have been found in nature among pathogens that are sensitive to this product (Andreyeva, 1978).

The 1,2,4-thiazole class is a new class of organic compounds that are used to manufacture fungicides. The Bayer Company (FRG) has proposed for practical purposes the systemic fungicide bayleton (triademifon), which contains 25% 1-(4-chlorophenoxy)-3,3-dimethyl(1H-1,2,4-triazolyl)-2-butanol, with LD<sub>50</sub> 1750-2500 mg/kg. In doses of 125 g/ha, it is active against many pathogenic fungi referable to the Ascomycetes, Basidiomycetes and other

classes of fungi. In a concentration of 0.0025%, this product depresses powdery mildew of fruit, berry, vegetable and grain crops; it is active against grain rust; when used to treat seeds, it is active against wheat and barley smut, as well as other types of grain smut. Bayleton is not active against helminthosporiosis. It is mixed with maneb and other fungicides to broaden the spectrum of action.

A fungicide developed by the Ciba-Geigy Company (Switzerland), CGA-48988, which contains methyl-N-(methoxyacetyl)-N-(2,6-dimethylphenyl)-alanine as the active ingredient, has basically new properties; its LD<sub>50</sub> is 699-788 mg/kg. Unlike the above-mentioned groups of new and known fungicides with systemic action, this product, which was named ridomyl, is active against fungi of the Oomycetes class. In particular, ridomyl presents high fungicidal activity in fungi of the genera *Peronospora* and *Phytophthora*. The dosage used is 200-300 g/ha. It is necessary to treat plants 3-4 times during the vegetation period. This product is of interest to the USSR for prevention of peronospora leaf spot of onions, since contact fungicides, particularly zineb, are not active enough due to the fact that they are rapidly washed off the smooth surface of onion leaves.

Among the new contact fungicides, we must mention the 50% rovrail WP, which was developed by the Rhone-Poulenc Company (France) and contains isopropyl-carbamoyl-1-(3,5-dichloro-3-phenylhydantoin) (26,019, glycophen) as the active ingredient, and its LD<sub>50</sub> is 3500 mg/kg. In concentrations of 0.1% or higher, it depresses gray rot of grapevines. In a dosage of 1000 mg/kg, its protective properties are retained for up to 20 days; when used in doses of 500, 250 and 125 mg/liter, its action lasts for 80, 61 and 30 days, respectively. Rovrail is active against *Monilia fructigena*, *M. laza*, *Sclerotinia sclerotiorum*, *S. cepivorum*, species of the genera *Aspergillus*, *Penicillium*, *Fusarium*, *Rhizopus* and others, in addition to fungi of the genus *Botrytis*. When rovrail is used in the above doses, residues thereof in grapes constituted 3.5-4.3 mg/liter, or else none was demonstrable. All of the above-mentioned fungicides with systemic and contact action, which were developed by the firms mentioned, have been successfully tested in different parts of the Soviet Union, and they are of interest with regard to inclusion in the assortment of fungicides. The development of original products with low toxicity will make it possible to protect the most important agricultural crops from the most dangerous pathogens. In the future, attention will be concentrated primarily on a search for agents that are safe to the environment, as well as development of chemical products that would be effective against vascular diseases, such as wilt of cotton and other plants, phytophthora infection of potatoes, rust of grain crops, gray rot, peronosporosis and other dangerous plant diseases.

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MEDICINE AND PSYCHOLOGY

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 5, 1979 pp 45-51

[Article by M. M. Kabanov (Leningrad) and G. I. Tsaregorodtsev (Moscow)]

[Text] Against the background of increasing rate of social development, scientific and technological progress, introduction of conveyer systems and automation in industry, the psychosomatic problem acquires particular importance. With the transition from one stage of social development to the next, the psychoemotional attitudes of people are becoming increasingly complex and the former psychological dissociation is disappearing. At the present time, all channels of emotional correlations are filled to capacity, and occasionally they are overfilled. The nervous system of man is subject to constant and ever increasing emotional and psychological "bombardment," ranging from healthy, fortifying emotions to negative and even pathogenic ones. The pace of life is increasing, technology is becoming obsolete within a very short time, some occupations are becoming obsolete, there is faster development of science, technology, culture, etc. All this makes new and greater demands of the internal resources of man, an important component of which are mental health and emotional equilibrium.

The role of the psychological factor has increased immensely in all areas of life in this century of intensive scientific and technological progress, enormous socioeconomic changes and conquest of space. While formerly the source of psychoemotional trauma was referable primarily to the area of life and interpersonal relations, the situation has now changed. Labor is undergoing intellectualization: it involves an increasing share of elements of mental activity, with great responsibility for the work being performed and increasing demands of man's organs and systems.

The increased role of mental labor in the overall balance of labor in modern industry requires that physicians and researchers pay more attention to the study of the influence of intellectualization of labor on the function of all systems of the body, i.e., the psychosomatic problem. The wide use in industry of control consoles makes it imperative to investigate the "carrying capacity" of sense organs, distribution of attention, hygienically desirable work day for operators, etc. Hence it is understandable that the psychosomatic problem is coming closer and closer to different aspects of industrial physiology, hygiene, psychology, etc.



While the current stage of social development is characterized by a faster life pace in all areas, the rate of psychophysiological and somatic reactions of the body is often too slow, lagging behind the pace of social and industrial life.

The psychosomatic problem is also acquiring special importance in view of the tremendous social changes. The urbanization process, involvement of many people in national production, development of the mass media and the enormous flow of information are increasingly "psychologizing" man's life and saturating it emotionally. This requires constant upgrading of level of education and special training, which is also a factor of intellectualization and psychologization of life. This process also affects the nature of pathology. A man who has to deal more often with psychological factors is more susceptible to their influence.

The psychosomatic question also has another distinctive feature: there has been a change in the nature of influence of mental factors on man's health. Previously, when referring to psychogenic diseases, one usually had in mind general functional disorders of the nervous system and different organs. Now, the emphasis has shifted to another plane in the psychosomatic problem: we are dealing with the role of mental factors in onset of morphological destruction, sometimes severe, of various human organs.

Under modern conditions, there is an increasing change in correlation between quantity and nature of psychoemotional stimuli and possibility of physical reactions to them. Man's "hormonal reserve," which emerges in psychoemotional stress situations, is not always expended because of man's decreasing physical activity. At the present time we are witnessing a consistent trend: with decrease in general physical activity of the body and in its physical conditioning, there is an increase in force of influence of pathogenic psychoemotional factors.

It is known that, in the course of evolution, emotions appeared as a factor that prepares the body to great physical loads, with which diverse biologically active substances were almost entirely used up. Under modern conditions, emotions do, as before, play an evolutionarily developed and phylogenetically secured role of a factor that prepares for intensive muscular activity. But the distinctions in the life of modern man are leading to a constant decrease in active muscular activity. For this reason, the biologically active substances secreted with emotions and utilized less and less as a result of diminishing physical activity are transformed from an adaptive and useful factor into something pathogenic.

In the West, numerous reactionary theories and diverse pessimistic forecasts are appearing in connection with and on the basis of the psychosomatic problem. In the literature of bourgeois countries, there is broad reflection of the opinion that intensification of man's life style in the presence of the scientific and technological revolution supposedly inevitably leads to neuroticism, that man's efforts to adjust to the forced pace of life on a mass scale generate diverse mental diseases. It is unquestionable that

the intensification of all aspects of a man who is exploited, the constant uncertainty, even about the immediate future, and militaristic psychosis are instrumental in the systematic rise in incidence of mental illness. But it would be wrong to extend this distinction, which is inherent in an exploiter society, to any society, including a socialist one, as is done by the adherents to the theory of a "single industrial society" and its medical variant, theory of "diseases of civilization."

Various means of communication between people are among the powerful channels over which scientific and technological progress affects mental health of the people. Such intensification of emotional life, which increases human contacts, not only within specific countries but on an international scale, leads to an increase in mental loads, and in a number of cases they develop into neuropsychic loads.

Humanization of interpersonal relations in micro- and macro-groups, and creation of a healthy psychological climate on all levels of interpersonal relations under socialism have a positive sociohygienic significance and aid in strengthening mental health.

At the present time, along with the protracted "tenure" of pedagogic psychology, rapidly developing engineering psychology has emerged, as well as space psychology, which is related to the latter but has its own specifics, legal psychology and medical psychology, which is gaining the increasing interest of physicians in many specialties. The latter is the name given to a discipline bordering on psychology and medicine, which deals with psychological aspects of diagnostics, prevention, treatment and social vocational rehabilitation of a number of patients. Medical psychology must investigate not only the psychological distinctions of a patient, their role in development of his disease, but the relations between the patient and physicians, nurses, other patients in a medical institution, family and friends. The study of the so-called internal signs of a disease, i.e., the patient's conceptions of his disease, which may be distorted or false, is an important psychological factor that is of enormous importance to correction of some emotional experience of the patient (in essence to psychotherapy).

It should be stressed that, at the present time, mediopsychological research has made a breakthrough from the traditional area of its application (mental disease) into clinical practice referable to the most diverse branches of medicine: cardiology, pediatrics, neuropathology and oncology. Medical psychology acquires exceptional importance at the critical stages of man's life (puberty, involution), when many biological, psychological and social problems arise. The instability, vulnerability of the adolescent's mental status, increased sensitivity both to drugs and careless words in elderly individuals are common knowledge. In the last 2-3 decades, investigation of the age-related aspects of different diseases, including the psychological aspect, is acquiring first and foremost importance in connection with accelerated development of children and adolescents, as well as the increase in

number of elderly people. There must be expansion of the network of medical institutions that deal specially with these aspects (pediatric-adolescent and gerontological offices at polyclinics and specialized dispensaries).

Among the psychological categories, the concept of personality is presently the main concern of physicians and psychologists. It is not by chance that there is increasing interest in the problem of personality everywhere. It ensues from the process of continued humanization of medicine in socialist countries, which differs advantageously in this respect from the medicine of capitalistic countries. Our philosophical interpretation of personality ensues from the well-known theses of Marx about Feuerbach. Marx wrote that "the essence of a 'particular personality' does not refer to its chin, blood or abstract physical nature, but to its social qualities."\* As we know, the social traits of a personality are formed under the influence of environmental factors, communication and interaction with other people. Man becomes sick in society, he is subject to all sorts of influences by various people that have a psychological effect on the course of illness and recovery. Until recently, these influences were discussed more than actually taken into consideration when treating sick people (with rare exceptions, in the presence of certain neuropsychological diseases, for example, neurosis). At the same time, the research conducted at several scientific research institutes of our country (Institute of Cardiology imeni A. L. Myasnikov, USSR AMS [Academy of Medical Sciences]; Institute of Pediatrics, USSR AMS; Institute of Oncology imeni N. N. Petrov, USSR Ministry of Health; Leningrad Neuropsychiatric Institute imeni V. M. Bekhterev, RSFSR Ministry of Health; Institute of Physiology and Pathology of Circulation in Kaunas, Institute of Prosthetics, RSFSR Ministry of Social Security) demonstrated the enormous significance of psychological factors to prevention of complications, treatment and medical rehabilitation of patients with such serious diseases as myocardial infarction, cerebrovascular disturbances, malignant neoplasms and sequelae of trauma to the skeletomuscular system. There has been a sharp increase in the importance of studying psychological factors for preventive purposes and treatment of individuals with neurotic disorders and diverse psychosomatic diseases (essential hypertension, peptic ulcer, bronchial asthma, some skin diseases, etc.), as well as alcoholism.

The last years have been characterized by extensive penetration of concepts of rehabilitation of patients and the disabled in public health practice, as well as social security institutions. Rehabilitation refers to utmost social and vocational recovery of patients, as well as optimum involvement in ordinary life. In medicine, the following could be the slogan for this direction: "We should strive more to add life to years than years to life." The conception of rehabilitation, one of the basic principles of which is to appeal to the patient's personality during any medical treatment and measures (drug therapy, psychotherapy, social factors), requires upgrading of knowledge in the area of psychology (general, medical and social) by physicians in all specialties and, of course, first of all by psychotherapists.

\*K. Marx and F. Engels, "Soch. [Works], Vol 1, p 242.

Incidentally, medical psychology and psychotherapy are closely interrelated. Some scientists in our country and abroad consider, not without grounds, that psychotherapy is a part of medical psychology. Others, for example, such a prominent Soviet scientist, physician and psychologist as V. N. Myasishchev, stress the fact that medical psychology is the theoretical foundation for psychotherapy which, in turn, is closely linked with medical pedagogics. The range of disciplines that help modern medicine learn about the personality of a sick man and make use of it for therapeutic purposes, as it is related to the immediate environment (microenvironment), is presently being augmented by a direction of research that could be called medical sociology (Winter). Apparently, it is now time to also refer to the medical aspects of social psychology, which are particularly important to development of theses of so-called treatment by the environment, as well as group psychotherapy, including that of families. At the present time, the correlations between physician and patient have become the object of close scrutiny of medics, psychologists and sociologists. In this era of scientific and technological progress, many intermediaries have appeared between the attending physician and the patient: diverse and sometimes very complicated diagnostic instruments, including computers, the increasing flow of laboratory tests and increasing number of consultants in the narrow specialties. Even at the same highly qualified medical institution, there is one specialist, for example, who diagnoses and treats well diseases of the ear, another who does so for the nose, another yet for the throat, etc. Such differentiation of specialists pertains to all medical disciplines. As a rule, the man as a whole, the patient's personality, are overlooked; at best, attention is given to "more sophisticated services," deontological training of the personnel and nothing more. Yet we are dealing with serious, scientifically substantiated introduction to broad medical practice of both methods of psychological examination and methods of psychological correction (psychotherapy). It is imperative to stress the close link between methods of psychological diagnostics and psychological correction. One should ensue from the other. At the same time, it is still not uncommon to encounter dissociation of specialists skilled in psychodiagnostics and those concerned with psychocorrection (psychotherapy). It does not occur to anyone to train physicians that are specialists in general medical diagnostics, apart from specialists in therapy, although in practice there can and should be a relative preference for one over the other (for example, the diagnostic aspect of a physician's work is, of course, predominant in the case of various forms of medical expertise). But, in principle, any physician should be able to diagnose in order to administer treatment, otherwise he loses his professional image. The same applies to the medical psychologist. In our opinion, only a well-trained individual can be either a psychologist or physician. In principle, he should also be trained in the art of psychological diagnostics (which is being done to some extent) and in the art of psychological correction (i.e., psychotherapy), although, of course, here too, there are quite justified "leanings" in one direction or other of practical work. At the present time, the range of activity of the modern psychotherapist is broadening appreciably. A decision adopted by the working group of WHO states: "At the present time, we see



a trend toward gradual change from therapy based on a purely individual approach to a mixed system, that could include treatment that takes into consideration the social environment at a hospital, various forms of group activity, group rehabilitation, consultations on domestic problems so as to obtain changes both in the intrapersonal and social environment."\*

The attitude of others, primarily relatives and work colleagues, toward the patient or invalid and his disease (bad habit, deformity) is a rather important factor that sometimes plays a substantial role in social and vocational rehabilitation. Underestimation of this circumstance by no means aids in prevention of various complications and disability; not infrequently, this is the cause of inefficacy of therapeutic and rehabilitation measures (this is particularly evident in the treatment of individuals suffering from alcoholism).

The matter of safeguarding the health of Soviet people is a national task that is of first and foremost importance to continued successful development of a socialist society. The proceedings of the 25th CPSU Congress, which correspond to articles in the new constitution of the USSR, appeal to all Soviet people to aid in fulfilling this national task. The psychological factor must play an important role (of course, not at the expense of giving less attention to other factors that determine the nature of a disease, for example, genetic ones) in the matter of optimizing measures for the prevention and treatment of cardiovascular, neuropsychiatric, oncological and other diseases that have a tendency toward having a protracted course and that are sometimes a threat to life. At the same time, the situation with medical psychology leaves something to be desired. There is no standard approach to instruction of this subject at VUZ's referable to different specialized fields. At medical institutes, a course of lectures and clinical studies in medical psychology for future general practitioners is offered in a rather simplified form (usually in the departments of psychiatry). Interestingly enough, the number of hours of instruction, which is negligible per se, reserved at VUZ's for medical psychology is smaller than at nursing schools (?!). Relatively recently, there was an article in our press (LITERATURNAYA GAZETA [Literary Gazette], 14 Dec 1977, by Pavel Beylin, writer and physician) that justifiably voiced amazement at the strange proportion between number of hours scheduled in VUZ syllabuses for "learning about the body--7781 hours" and "for learning about the mind---...19."

In our opinion, it is high time to consider the question of screening individuals entering medical institutes, not only on the basis of the score they received on tests. In addition to recommendations from their place of work or prior education (which is, alas, very formal in some cases), one must take into consideration the psychological distinctions of the graduate, the future physician, and primarily his capacity for empathy, i.e., for

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\*Report on a conference of the WHO working group, Krakow, 8-11 May 1973.

participation in the feelings of another. For we know that individuals who have only good general knowledge are not accepted at art or music VUZ's. There is no reason to conceal the fact that, mentally [spiritually] blind people incapable of emotional contact with a patient are, unfortunately, found among those who graduate from medical institutes. For this reason, there is no end to complaints of indifference, harshness and, sometimes, lack of contact and even rudeness of some medical workers, thus shaming the most humane profession. This is also the source of the not infrequent cases of so-called iatrogenic diseases, i.e., diseases that are caused by the careless, psychologically thoughtless words or deed of a physician.

At the same time, we hear statements indicative of the danger of excessive psychologization of medicine, the danger of penetration of bourgeois methodology and ideology following certain psychological conceptions and methods. There is indeed such a danger, but one has to fight against it. But a fight must also be waged against another danger, that of biological reductionism (unilaterality) in physician training and work. There is no need, as is sometimes the case, to adopt a cautious attitude about the appearance of psychologists at therapeutic and preventive institutions. They have begun to appear there in recent years more and more often, although most of them cannot acquire their own professional status. Even where it becomes clear that there are benefits from the work of psychologists (and this may not be evident right away), they often have to exist as "second-class" citizens, since the administrators of the institutions where they are employed do not have a legal on-staff roster of appropriate positions. At the same time, for many years there has been a logopedic service in Moscow, Leningrad and a few other cities, where physicians, psychologists and pedagogues are working well, mutually supplementing the work done by them, which is directed toward the control of a rather widespread morbid phenomenon, speech disorders. The model of this team work could be extended to other services that require the involvement of psychologists. It is imperative to consider coordination of the work done by all medical services, in which the participation of psychologists is involved. The psychotherapeutic offices that exist at some general medical polyclinics, the consultation offices for domestic relations and social hygiene that have been opened here and there, as well as the psychotherapy offices at neuropsychiatric dispensaries require general methodological supervision. The lack of a sufficient number of qualified psychotherapists (physicians and psychologists) is being felt more and more. The problem commission for medical psychology of the USSR AMS, which is based at the Leningrad Neuropsychiatric Institute imeni V. M. Bekhterev, RSFSR Ministry of Health, is for some reason under the jurisdiction of the scientific council for psychiatry, and for this reason has limited opportunities to coordinate scientific research and organize clinical work in all other branches of medicine.

The psychology faculties of Moscow and Leningrad universities are training specialists in medical psychology following syllabuses that differ substantially from one another and require refinement, as well as conformity with clinical demands. As a result, the graduates sometimes encounter



difficulties in obtaining employment. The USSR Ministry of Health has still not prepared the norms for regular staff of medical psychologists at medical institutions (they are needed, first of all, in neuropsychiatric and cardiological hospitals and dispensaries, rehabilitation departments referable to different specialties, pediatric and adolescent departments and offices). Much time is spent in academic medical circles on frequently fruitless debates concerning the place and importance of the psychologist in modern public health practice. Apparently, it is now time for the ministries of health and education, along with other concerned agencies and head scientific institutions (Institute of Psychology, USSR Academy of Sciences; Institute of Cardiology, USSR AMS; Leningrad Neuropsychiatric Institute imeni V. M. Bekhterev, RSFSR Ministry of Health, and others), to develop a statute [position] on the psychological service in public health agencies. This service, when introduced gradually, with much thought and competence, with due consideration of the specifics of a particular therapeutic and preventive institution, is a mandatory prerequisite for improving the effectiveness of work in the field of safeguarding the health of the Soviet people.

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SOCIOHYGIENIC PROBLEMS OF PUBLIC HEALTH CARE IN THE LIGHT OF THE DECISIONS OF THE TWENTY-FIFTH CPSU CONGRESS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 5, 1979 pp 3-10

[Article by A. P. Serenko (Moscow)]

[Text] The historical documents of the 25th CPSU Congress, which are the result of the collective creativity of the Party, constitute an example of Marxist-Leninist scientific analysis of all areas of political, social, economic and cultural life of a modern society.

In his report to the 25th CPSU Congress, L. I. Brezhnev stressed: "New opportunities for fruitful research, both general theoretical, basic and applied, are revealed on the borderline between different sciences, in particular the natural and social ones. Full advantage should be taken of them."\*

These instructions have a direct bearing on sociohygienic research, since it helps disclose comprehensively the complex relations between social living conditions and public health, the bases for successful fulfillment of current and future public health tasks.

Social hygiene and public health organization are faced with important tasks of continued in-depth investigation of the trends of public health, patterns of development of public health care as a branch of the socialist national economy and development, on the basis of scientifically substantiated conclusions, of refined forms of organization of a system of therapeutic and preventive care that reflects the achievements of scientific and technological progress, and which provides a solution to the most important problem, that of increasing the effectiveness of the entire system of public health and improving the quality of therapeutic and preventive care.

Comprehensive investigation of the health status of the public, its relations to changing socioeconomic conditions of modern life, scientific and

\*"Materialy XXV s"yezda KPSS" [Proceedings of 25th CPSU Congress], Moscow, Politizdat, 1976, p 72.

technological progress is the decisive direction of our endeavors, the foundation of theoretical premises and practical recommendations; the former determine radical changes, not only in the field of national production, but the natural environment that involves all elements of social life in its orbit, causing changes that have important sociohygienic consequences.

Completion of the complex research on health status of the public in our country is an important phase of continued accumulation of knowledge about the nature of pathology of the public, which enables us to demonstrate new and important trends of public health at the present stage.

The multilevel nature of research, which takes into consideration the economic, geographic and ethnic distinctions of different parts of our country, its large scope and depth, sophisticated methods and representativeness of data have provided reliable information about the health status of the public and changes therein.

An important positive distinction of this research is the standard methodology used for the study of the main aspects of health: morbidity, reproduction and physical development of the people.

The method of adjusting morbidity data according to data referable to requests for medical care and results of complex physicals performed by a unified method made it possible to demonstrate the most fully the levels of chronic and acute pathology. Along with the theoretically and practically important results of this investigation, we must stress its importance with regard to methodological refinement of health statistics.

At the present time, we can discuss as a realistic task the development of an information system based on registers for selected population groups using third generation computers. Creation of these registers will provide for dynamic observation of the necessary groups; it will permit obtaining information on the cause-and-effect aspects of morbidity and mortality, which is extremely important for in-depth analysis of these processes and scientific substantiation of measures in the field of public health that are directed toward improving the health status of the public.

While we acknowledge the priority of research dealing with the health status of the people, we should emphasize the particular social and medical importance of complex studies of the health status of children. The socioeconomic achievements of our country, the advances in public health and medical science have aided in significant improvement of the health of children, as well as drastic reduction of morbidity and mortality of children. Thus, child mortality, which is one of the indices characterizing the health status of children, dropped to 22.9 per 1000 births by 1971. However, in the 1970's, the process of decline of the child mortality index was replaced by a trend toward elevation in our country. Sociohygienists, pediatricians and obstetricians have not been able to answer the question of why there is worsening of some indices of child health or to offer scientifically

substantiated sets of measures to strengthen the health of children, differentiated for different regions of our country.

In our country, extensive studies are being pursued of the health status of infants; however, they are all conducted using different methods, and the results cannot be compared. In most works, there is no complex approach to work on problems. The researchers concentrate primarily either on the study of some particular index of health or the influence of a very limited number of factors without consideration of their combined effect.

For a long time, the index of child mortality served as the main, decisive criterion of a good situation in the matter of preserving the life and health of children in our country and abroad. However, the indices of infant morbidity in the first year of life are acquiring increasing importance as the first and foremost parameter of health characteristics. Expressly the study of morbidity with determination of the patterns of onset and course of diseases makes it possible to explore the means of lowering infant mortality in the first year of life.

Data on morbidity are of interest, not only as an indicator of child health, but as an "aggregate gage" of the scope and nature of medical care rendered to children. Child health as a social phenomenon with a biological foundation is a complex problem, and it is determined by a set of factors that differ in nature.

Social hygienists concerned with child health are faced with the task of giving a complex evaluation of the health status of children, demonstrating the main cause-and-effect relations, evaluating the direction and extent of influence of different factors and complexes thereof on formation of health indices. The program of complex investigation of child health, which is being implemented at the All-Union Scientific Research Institute of Social Hygiene and Public Health organization imeni N. A. Semashko, deals with this task.

Studies pertaining to complex evaluation of the health status of children (their physical and mental development, morbidity and mortality levels) will be pursued in different parts of our country on the basis of the above method; a comparative analysis will also be made, in the course of which it will be possible to single out the prime sets of deleterious factors for each region, knowledge of which is mandatory for development of scientifically substantiated suggestions on implementation of measures to strengthen the health of children in a specific region. After this, on the basis of a permanent computer register, monitoring will be organized in selected areas of the health status of children (on the basis of a limited range of the most sensitive indices), as well as records of the set of prime factors for a given region, which would make it possible to promptly detect changes and to react to them adequately.

In the documents of the 25th CPSU Congress, much attention is devoted to problems of population growth. Population is the most important element of

the social organism; for this reason, it is becoming necessary to constantly assess the nature of demographic processes and their socioeconomic consequences, in order to increase the effectiveness of development of a socialist society. Analysis of the entire set of questions related to the main economic and demographic consequences of population growth makes it possible to make decisions pertaining to wise use of manpower resources, location of industry and population in our country.

The present demographic situation is notable for extreme diversity, since it is determined not only by economic factors, but indirectly by social relations and the demographic behavior of different population groups.

Public health agencies are directly concerned with a more comprehensive analysis of general mortality trends and causes of death in different population groups. The recommendations that ensue from analysis of such data help take the fullest advantage of public health capabilities to improve organization of medical care and dispensary supervision of different population groups.

The demographic situation in our country is characterized by some decline of birth rate, rise of infant and adult mortality, particularly males, and stabilization of mean life expectancy.

In the USSR, as in other economically developed countries, the chief causes of death of the entire population are diseases of the circulatory system, malignant neoplasms, accidents, poisoning and trauma, and diseases of respiratory organs. The deaths referable to these four groups of diseases constitute about 90% of all deaths. There are some distinctions to the causes of death in rural areas: while cardiovascular diseases remain in first place, diseases of respiratory organs are in second place, malignant neoplasms are third, accidents, poisoning and trauma are fourth.

The causes of death also fluctuate according to sex and age. The rise in mortality due to diseases of the circulatory system is largely attributable to aging of the population. However, there is also a real rise in mortality, as confirmed by the dynamics of age-related and standardized indices. The rise in mortality occurred mainly due to ischemia and cerebrovascular lesions, which constituted about 90% of all deaths due to diseases of the circulatory system.

In all economically developed countries, including the USSR, malignant neoplasms are in second place among causes of death. Typically enough, malignant neoplasms constituted only 4.4% of causes of death among the urban population of the USSR in 1939, and the figure was 17.6% in 1976. The advances in Soviet medicine and achievements in oncology (early detection of cases of disease, more accurate records thereof and wide use of complex methods of treatment) altered the trend of mortality due to malignant neoplasms in the direction of a decline. In the USSR, it is lower than in most economically developed countries.



Analysis of mortality referable to accidents, poisoning and trauma merits special attention; these are the chief cause of death of children over 3 years old and individuals of employable age (men up to 50 years of age and women up to 40).

Analysis of the dynamics of mortality referable to diseases of respiratory organs revealed that there has been some rise, mainly due to chronic, non-specific lung diseases.

The index of mean life expectancy is the most accurate one, which summarizes the characteristics of public health status, reflecting the entire set of factors that affect it. Mean life expectancy increased from 44 to 70 years from 1926-1927 to 1969-1970. For men, mean life expectancy increased by 1 year, from 64 to 65 years, between 1958-1959 and 1969-1970; for women, it increased by 2 years, from 72 to 74 years. This index became stabilized in the following years.

Analysis of the demographic situation indicates that public health has made enormous strides and the health status has improved, along with improvement of social living conditions. For this reason, evaluation of the effects of socioeconomic, cultural and ethnic factors is gaining in importance; knowledge of these factors could also aid in upgrading the effectiveness of performance of public health institutions.

Broader involvement of institutes specializing in sanitation and hygiene in the study of the link between living conditions, particularly environmental conditions, and the dynamics of medicodemographic processes will, no doubt, aid in solving population growth problems.

The 25th CPSU Congress pointed to the need for continued refinement of the public health system, broad introduction to medical practice of the advances of modern science, new diagnostic and therapeutic methods, intensification of disease prevention. Public health agencies are faced with an important task: prompt and complete implementation of these Congress decisions. At the present time, the main direction of work is to upgrade the quality and effectiveness of medical care, to devote more attention to questions of further specialization and integration of medical care.

In this regard, investigation of the public needs for different types of specialized medical care, scientific substantiation of priorities in the development of specific types thereof, organizational means of providing for the most expedient integration on different levels is acquiring exceptional importance.

Much attention is being devoted to complex work on problems of planning and forecasting in public health, the main objective of which is to provide for proportionate development of our discipline in accordance with the actual material and manpower capabilities of our country.



Extensive social and medical preventive work is the foundation for development of socialist public health care. The constant development and refinement of the system of dispensary supervision is a vivid reflection of the preventive direction of public health. Introduction of dispensary care proceeded concurrently with development of the entire public health system, and it was considered the most important and mandatory prerequisite for progress in resolving the multilevel problems of safeguarding the health of the people of the USSR.

The program of the CPSU spelled out a new strategic objective: to provide dispensary care for the entire population. Such coverage includes a diversity of aspects of therapeutic-preventive, sanitary-hygienic and epidemic-control work by public health agencies; it deals with all its elements, becoming its substance and the chief method of safeguarding public health.

At the present time, a large-scale experiment is in progress in the USSR on determination of organizational forms and scope of care in the transition to total coverage by dispensary care. Its objectives are: to develop theoretical and methodological problems of the gradual [in stages] transition to dispensary care of the entire population, definition of the role and place of preventive physicals in placing different population groups under dispensary supervision, definition of the scope and nature of work of medical institutions of different types, extent of involvement of physicians in different specialties, different diagnostic services for the short and long range, determination of reasonable forms of organizing dispensary coverage and mass scale physicals, development of standard indices, scope, quality and effectiveness of dispensary supervision, use of goal-oriented program methods, etc. Performance of this complex study on a highly sophisticated level and prompt completion thereof will constitute an important stage of refinement of the entire public health system, with further emphasis on its preventive direction.

Development and implementation of complex measures directed toward upgrading the quality and effectiveness of medical care of the public, primarily in outpatient polyclinic institutions remain as the first and foremost tasks for social hygienists and public health organizers. For several years, this problem has been the main one among the topics of scientific research pursued at the main departments of the institute. The objective of these investigations is to optimize the therapeutic-diagnostic and preventive process in different types of outpatient polyclinic institutions, as well as substantiation of organizational means of upgrading extramural care. Analysis of the role and place of the district physician (general practitioner and pediatrician) as the main specialist in the system of ambulatory polyclinic care merits special attention.

The All-Union Scientific Research Institute of Social Hygiene and Public Health Organization imeni N. A. Semashko has completed the first phase of a long-term complex investigation, the purpose of which is to provide

scientific substantiation for the principles involved in building a network of medical institutions with due consideration of long-term plans for urban development. The main factors have been defined that influence development of the network of medical institutions; tendencies have been demonstrated in continued specialization of medical care of the urban and rural population in oblasts, cities and rural regions of different types; a model has been constructed of the optimum spatial location of the network of hospitals for oblasts with different types of population density [settlements].

The question of controlling cardiovascular diseases has acquired special social importance. The complex investigation being pursued at our institute is coordinated with several leading scientific research institutes and, first of all, with the All-Union Cardiological Research Center of the USSR Academy of Medical Sciences.

The changes that are taking place in agriculture are closely linked with problems of organizing medical care for rural workers. For this reason, scientists are constantly conducting a search to refine organizational ways and means of rendering medical care to the rural population.

In the light of the decisions of the July (1978) plenum of the CC CPSU, the first and foremost task for both scientific teams and public health agencies is to equalize the level and, mainly, quality of medical and preventive care rendered to the urban and rural population.

Expansion of the scope and refinement of scientific research in the field of woman and child health care constitute an important task set forth by the 25th CPSU Congress. The main directions of such research are: the study of health status of different groups of women and influence on it of working and living conditions, determination of the nature and incidence of pathology of pregnancy and parturition, causes of gynecological morbidity related to medicosocial factors. Completion thereof will aid in developing effective measures to improve working and living conditions of working women.

In the last few years, considerable work has been done in our country in the field of theory and practice of scientific organization of labor in the public health service.

It is imperative to continue with development of principles of scientific organization of level at the stage of designing new medical institutions and remodeling old ones. Office machinery and communications, many other technical and design elements in the area of refinement of medical labor must be included in construction plans.

Questions of economics and economic effectiveness of public health are very important in the program of sociohygienic research. In the last few years there has been intensification of scientific research dealing with economics of public health. They are directed toward more efficient use of material, financial and manpower resources placed at the disposal of Soviet public health. As a result of these investigations, not only have

monographs been written on economics and planning of public health, but recommendations have been offered to upgrade management work at public health agencies and institutions, on the basis of analysis of economic indicators of their performance. But it must be conceded that the scope of research dealing with public health economics and use of economic analysis in the work of public health agencies and institutions is still inadequate.

Under current conditions, it is becoming important to pursue deeper economic analysis, and to use it in public health planning in order to select the optimum variant of a plan. This should be aided by the use of computers and mathematical-economic methods, automated processing of statistical and management data.

The following are important tasks defined by the 25th CPSU Congress: broad use of modern computer technology to solve problems, development of an automated system of planning and management on different levels. Opportunities are made available for deeper statistical analysis of different directions of performance of public health agencies and institutions, including analysis of utilization of material and personnel resources. When these tasks are performed, a new qualitative solution will be obtained to cardinal problems of current and future development of socialist public health.

Traditional statistics no longer satisfy present requirements of public health management. The main task now is to make use of statistical data, rather than merely gather and process them. The information itself is now viewed as the result of in-depth analysis of statistical data, which make it possible to discern with reliability new trends in public health, to assimilate the public health resources and make use of these analytical conclusions to refine public health management.

Proceeding from systems analysis, the main content of work pertaining to optimization of statistical information consists of two major parts: first, comprehensive investigation of practice and main tasks of public health management, the decision-making process, methods of planning and checking plan fulfillment, as well as investigation of many other managerial functions that require statistical back-up; in the second place, in-depth analysis of existing health statistics information, development of a system of indicators with determination of their input channels and coordination and, finally, preparation of organizational and methodological recommendations to upgrade statistical information.

Socialist public health, which is a qualitatively new, higher stage of public health, is based on the theoretical principles expounded by N. A. Semashko and Z. P. Solov'yev, the founders of Soviet social hygiene and outstanding public health organizers, with the direct involvement of V. I. Lenin. These

principles, which have been carried out, are immovable. They constitute the theoretical foundation of socialist public health.

At the same time, in a well-developed socialist society, which provides for basic changes in the economy, social and cultural life at the time of the scientific and technological revolution, new and important problems, which require in-depth theoretical resolution, are confronting social hygiene and public health organization.

What then are the main directions of theoretical research on which attention and available creative capabilities should be concentrated? First of all, there is comprehensive investigation of the routes for development of the public health advances in the USSR and socialist countries, formation of socialist public health care as an international system. Theoretical generalizations of the knowhow of socialist countries will help in disclosing more completely and making use of the really unlimited opportunities of the socialist regime in solving problems of public health care, in making a critical revision of a number of theses, scientifically substantiating the prospects of development of medical science and practice with due consideration of the ever increasing integration and cooperation of sister nations.

It is of political and ideological importance to work on theoretical and organizational problems of modern socialist public health care, supported demonstration of our achievements, disclosure of the advantages of a socialist society with regard to solving the most important problems of safeguarding and strengthening the health of all the people.

The current stage of social development is characterized by the ever increasing influence of the scientific and technological revolution, which has caused cardinal changes, raised basically new economic and social problems. Comprehensive investigation of sociohygienic aspects of scientific and technological progress has advanced at the present time to the ranks of the most pressing tasks, not only of theoretical interest, but of great practical importance.

There are two main directions of work on this problem. The first is to demonstrate the influence of the scientific and technological revolution on public health, comprehensive analysis of multilevel ecological problems, urbanization, changes in structure and nature of industrial and agricultural production, material and spiritual living conditions, etc., from the standpoint of social hygiene. In-depth analysis of these questions, with critical evaluation of positive and negative aspects and, what is extremely important, disclosure of the causes of possible adverse influence of the scientific revolution on physical and mental health are acquiring first and foremost importance. Such investigation will make it possible to substantiate several important sociohygienic positions and proposals that would permit taking full advantage of our social regime, the socialist public health system, for the purpose of making optimum use of the capabilities of scientific and technological progress in the interests of man's health.



The second direction refers to investigation of the influence of the scientific and technological revolution on development of medical science and public health care, i.e., directly on our discipline. Here, it is imperative not only to determine what has already been achieved, but to outline the prospects and provide proper orientation in solving problems of development of public health care.

We are witnessing an evolution of views on the role and place of public health in a modern society, its social and economic significance. Some substantial changes have taken place in the public's attitude toward their health status; the demands made of public health services are increasing; the relations between physician and patient, whose sophistication and medical knowledgeability are consistently increasing, are also changing. It is high time to make a sociological study of the public's attitude toward health and health care. We believe that this should not be started in the general aspect, but concurrently with resolution of major organizational problems and, first of all, in connection with experimentation dealing with dispensary supervision. By solving specific problems, such investigations will also make it possible to resolve methodological problems of sociological research in our field, to evaluate its significance and outline a program for its development.

Further work on questions of medical ethics and preparation of a comprehensive survey dealing with the ideological substance and basic distinction of the creativity of the Soviet medical workers, endowed with the most progressive socialistic ethics, is important also. Against the background of increasing ideological struggle, bourgeois theoreticians are intensively substantiating the concept of "convergence," in an effort to smooth over the increasing social contradictions in all areas, including public health care. Juggling averaged data and general indices, and using the latest mathematical techniques, they are trying to work out universal coefficients, optimum indices, etc., for comparative evaluation of existing public health systems. The main objective of such work is to nullify the social substance of public health care, to depict it as a technical service, the success of which is determined by the economic capabilities of society.

We must set these conceptions against our Marxist analysis of development of modern public health, based on in-depth development of the substance of each of the problems considered, with critical evaluation of the objective possibilities of solving problems of public health under different socio-economic conditions.

Further complex work on the main theoretical problems of public health will arm practice with even deeper comprehension of sociohygienic processes of modern social development and thereby make a ponderable contribution to the solution of the most important social problem, that of safeguarding and strengthening the health of the Soviet people.

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BASIC DIRECTIONS IN RESEARCH ON CONTROL OF INFECTED BLOODSUCKING TICKS AND INSECTS ACTING AS VECTORS OF HUMAN DISEASES

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[Article by A. N. Alekseyev, USSR Ministry of Public Health Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy, Moscow]

[Text] Attention is turned to the need for controlling the infected part of the population of vectors of transmissible infections, for which purpose it is suggested that the nature of the parasitic existence of the agents be studied, synergists of their pathogenic action be sought, and the ecology of the vectors be studied to permit application of resources by which to control the infected part of the population at places of its concentration. A proposal is also made to intensify the search for microorganisms--to be used for biological control--that are not only pathogenic to the vectors but are also antagonists of human disease agents in the bodies of infected vectors.

The objective of eradicating ticks parasitizing agricultural animals is to eliminate them not so much in their role as disease vectors as in their role as ectoparasites. In precisely the same way, wherever severe human diseases transmitted by bloodsucking dipterans occur in significant amounts, we can ignore their role as components of the bloodsucking fly population, on the condition that we destroy the infected part of the population.

When we consider eradication of ticks in natural disease foci, we are most concerned with eliminating them precisely as disease vectors, since their role as bloodsuckers attacking man is not very great in most cases. Control is aimed in this case at achieving the greatest possible eradication of both real vectors--that is, those already infected, and potential vectors--that is, those capable of being infected. As far as ticks carrying tick encephalitis are concerned, some of the basic features of their biology--the length of the developmental cycle (up to 3-5 years) with their preimaginal and imaginal



diapauses, their gradual activation, and their relatively low mobility--make it necessary to use highly persistent pesticides (such as DDT) that are effective for a minimum of two seasons (23). Moreover Uspenskiy (21,22) demonstrated the basic uselessness of employing organophosphoric compounds to control Ixodid ticks, because the need for total suppression of the entire tick population--this is presently the sole achievable goal in control of the vector--requires repeat processing with organophosphoric compounds both in the course of one season and in a number of consecutive years.

Considering the needs of environmental protection, the lengthy persistence of DDT in the environment following tick control measures, which lasts up to 14 years (11), is also undesirable. Substitution of DDT by another organochloride preparation--dilor (22), which breaks down faster in the environment--does not basically solve the problem because it would have to be introduced into the environment at least once in one or two seasons, and because the goal of its introduction is the same as that of DDT--total suppression of the vector. We note incidentally that total suppression of the vector may be achieved only in a limited area, where even so the vector gradually recovers (12), and where despite absence of the principal vector the disease may continue to circulate (16), weakening in the first while after processing (25) and gradually recovering subsequently (6,25).

Consequently in our opinion we can and must maintain epidemic well-being through systematic purposeful suppression of precisely that part of the vector population that is infected by the agent.

It has been found in research on tick encephalitis virus and *Ixodes persulcatus* ticks (10) that there are definite, relatively short periods favoring persistence of the disease agent in nature through transovarial transmission. Thus we have an urgent need for reviewing the conception of total suppression of vector populations and for determining the prospects of using short-lasting insecticides. As far as controlling the infected part of a population of bloodsucking dipterans is concerned, in this case the use of long-lasting contact poisons in the daily resting places of insects--mosquitoes, which transmit malaria, and sand flies, which transmit pappataci fever or urban cutaneous leishmaniosis ("Ashkhabadka")--are aimed at rejuvenating the population, and annihilation of primarily the infected part. Difficulties arising in the use of this control method include development of resistance in malaria vectors to a broad range of insecticides.

Let us examine some of the directions of research which, if followed, would in our opinion lead us to ways to influence precisely the infected part of the population, in addition to achieving instant juvenilization, through the use of contact insecticides.

I. Study of Nature of Mutual Relationships Between the Transmissible Disease Agent and the Arthropod Vector, and Exploration of Parasitism Characteristics and

## Revelation of the Mechanisms of Pathogenic Action Upon the Host With the Purpose of Intensifying This Action to the Point of Host Death

It seems obvious that even a "mute" parasite such as tick encephalitis virus, which has not been able to tell us anything yet about its action on the life-span of ticks and their fertility, given normal infection of the animals, can nevertheless survive through a number of successive generations (8,26), and consequently it is hardly an entirely harmless symbiont such as, for example, the *Rickettsia*-like *Wolbachia pipientis* (37), which is responsible for cytoplasmic incompatibility of different races of *Culex pipiens* mosquitoes and which can be transmitted to an indefinitely large number of generations. Of course when tick encephalitis virus is introduced forcibly--through the anus--into *Dermacentor reticulatus* (=pictus), tick survival decreases by a factor of 3-10 on the 250th day in comparison with control ticks given Parker's solution. In particular, 4-13 percent of the experimental bloodsuckers survived while survival in the control group was 38-40 percent (31).

Thus there are good reasons for searching for both external labels of an agent's pathogenic action upon the vector's body on one hand--for example the death of ticks at the satiated imago stage (in the case of *Babesia* infection (20)) or the preimaginal phase (*P. tularensis* infection (18)), reduction of motor activity observed in *A. aegypti* mosquitoes infected by the *Filaria* nematode *Brugia pahangi* (29) and in *An. stephensi* intensively infected by *Plasmodium cynomolgi* (33), and lower feeding activity and suppression of fertility and even avoidance of infected hosts, as observed with *A. aegypti* feeding on chicks infected with *P. gallinaceum* (2)--and for signs of changes occurring at the biochemical level on the other hand.

Balashov et al. (3) find it possible to assert that obligate intracellular parasites--*Rickettsia*, which are pathogenic to people, are also variably pathogenic to the ticks themselves. This is manifested as change in respiratory intensity of infected specimens in comparison with uninfected ones (2) and as changes in the concentration of free amino acids in Ixodid ticks infected by *Rickettsia* (3). We are not yet sure as to precisely what enzymatic mechanisms are affected or inhibited owing to the presence of the disease agents, but research in this direction is doubtlessly promising, since by analogy it is fully possible that inhibition of enzymes in the respiratory cycle may occur. That which in all probability is observed in fleas "sick" with the plague (9)--reduction of gas exchange due to inhibition of enzymes participating in the Krebs cycle by plague toxin--is analogous to what happens in the bodies of warm-blooded animals under the influence of this agent (7). Consequently principal emphasis in research on agent-vector mutual relationships must be placed on that direction which would clarify the mechanisms behind the agent's negative influence upon the bloodsucker, the end goal of such research being to intensify this influence. The latter makes up the content of the second research direction.

## II. Exploration for Synergic Agents Amplifying the Pathogenic Action of the Disease Agent on the Vector's Body

I had earlier demonstrated (1) the basic possibility for using a systemic poison (fluoracetamide) mainly to destroy fleas intensively infected by plague microbes. The poison's probable mechanism of action lies in amplification of the inhibitory effect plague toxin has on enzymes participating in Krebs cycle. I am unaware of similar work with ticks or dipterans; however, it appears quite suitable to study the action of at least the acaricides available now (and preparations acting as analogs of juvenile hormone) on bloodsucking arthropods infected by human disease agents.

### III. The Third Direction, Closely Associated With the First, Foresees Not Only Maximum Suppression of the Viability of the Vector Itself But Also Suppression of the Microorganism It Carries That is Pathogenic to Man

We do not as yet possess experimental data of this sort in relation to ticks; however, data of this sort are available for bloodsucking insects. Thus in response to the action of an analog of juvenile hormone (a geranyloxymethylenedioxymethylene derivative) on triatomine bugs--Chagas disease vectors, the larvae in the fifth instar fail to achieve the imago stage. Although they suck more blood due to their larger size, they are seven times less susceptible to infection, and after 1.5 months experimental specimens contain seven times less disease agent than do normal specimens (31). The mechanism of this phenomenon is not fully clear. It may be a little too bold to hypothesize that juvenile hormone has an action on viruses or *Rickettsia* in the tick body, but research in this direction may turn out to be promising. There are of course data indicating a certain rise in sensitivity to a disease agent--Filaria--resulting from the influence of a chitin formation inhibitor. Thus the sensitivity of dimilin-treated *A. aegypti* mosquito larvae to *Brugia pahangi* was somewhat higher, but this action was not specific, and it was found to be analogous to the stressful effects of temperature (30).

The mechanism of antagonistic interaction between two microorganisms of the Protozoan world, one of which--the Microsporidian *Nosema stegomyiae*--is not only pathogenic to *Anopheles* mosquitoes serving as vectors but also blocks completion of the normal developmental cycle of *Plasmodium malariae* in the bodies of females infected by them (27), is more understandable. Curiously enough, mosquitoes that are most susceptible to *Nosema algerae* are also the most effective malaria vectors--*An. stephensi* and *An. albimanus* (36). We must also keep in mind acquisition of specimens with altered heredity to be used for genetic control, these individuals being less sensitive to the agent than are individuals from "wild" populations. In any case irradiation of *A. aegypti* infected by Filaria caused a decline in the former's susceptibility to parasites and a decrease in the number of invasive larvae within them (32).

It does not seem very probable that we can capitalize on the phenomenon of interference between entomopathogenic viruses and arboviruses, but in any case it is not absolutely excluded. The course of infection in an insect becomes extremely complicated when a foreign virus enters the picture (19), and it may be lethal to the insect. And while the way the virus enters the body of the tick encephalitis vector is still unclear, it is entirely possible to

imagine infection of mosquito larvae by virus interfering with transovarially and transphasally transmitted La Cross arbovirus. For this purpose it would be sufficient to process water basins (tree hollows for La Cross vectors) with a virus preparation. Attempts have not been made as yet in this direction in relation to either ticks or insects.

We are still unsure as to whether or not superparasites--viruslike particles--discovered in malaria agents have significance as man's "allies" in control of malaria agents (35).

#### IV. The Fourth and Last Research Direction May Be Called Ecological

This direction presupposes accumulation of knowledge on the ecology of agents of naturally occurring diseases, and mainly their relationship to vectors in time, depending on environmental factors. The goal of such research is to reduce the number of infected individuals in the population by achieving more precise directed use of existing control methods. We well know a classical example of this approach--attainment of an epidemiological impact by juvenilizing a population of malaria vectors through the use of persistent contact insecticides in the control of endophilic *Anopheles* mosquitoes.

A similar example for ticks with a long developmental cycle does not exist, and it probably cannot exist, but it is well known that only starving ticks, mainly females which had been infected by the virus in previous phases of development, quite frequently as early as in the egg phase, can have epidemiological significance.

Moreover research by Kondrashova (10) showed it probable that the level of natural infection of *I. persulcatus* imagoes is close to the viral load sufficient to support transovarial transmission and compensate for losses occurring during transphasal transmission.

It was established in this case that the longer the period between detachment of a satiated tick and the time it lays its eggs, the greater is the probability of virus transmission. The need for slower but yet more complete "maturation" of the virus in ticks at lower temperatures is apparently dictated precisely by unique features in the mutual relationships typical of this agent-vector pair. In Kondrashova's opinion transovarial transmission should be encountered more frequently among ticks maturing at lower temperatures: Among imagoes that complete their feeding in the first or second third of May--that is, among individuals that become active the earliest, and namely among those that are found to be infected in the greatest percentage of cases in nature (17). These are, as a rule, individuals of the second instar (13). We also know that as temperature grows and relative humidity drops, the titer of tick-borne encephalitis virus in ticks drops (14,15).

These facts are precisely what provide the grounds for suggesting that systematic use of acutely acting pesticides (organophosphoric compounds)



against this portion of the tick population--that which is infected the most intensively and which affords the greatest probability of virus survival through transovarial transmission--may suppress circulation of the virus in its principal vector, in a sense "curing" the vector.

Use of other biologically active substances, such as juvenile hormone analogs that inhibit oogenesis, may significantly intensify this effect, especially if the substances selected intensify the pathogenic effect of the parasitic agent on the vector's body.

Use of synergists of a pathogenic agent as a systemic poison may also be found to be promising in relation to both control of single-host ticks serving as human disease vectors and other bloodsucking arthropods, for example bugs and dipterans.

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SOME ASPECTS OF OCCUPATIONAL MORBIDITY AMONG AGRICULTURAL WORKERS IN  
BELORUSSIAN SSR

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 5, 1979  
pp 57-58

[Article by K. S. Lyashenko (Minsk), Belorussian Ministry of Health, submitted 9 Feb 78]

[Text] Industrialization of agriculture causes appearance of industrial factors in working conditions of sovkhoz and kolkhoz workers, and they result in elimination of differences in structure of occupational morbidity among industrial and agricultural workers. A. Petrauskas et al. and G. G. Rud' indicate that, because of the wide use of toxic chemicals in agriculture, the potential danger of occupational poisoning is one of the distinctions of modern agricultural labor. At the same time, according to the data of A. O. Navakatikyan et al., improvement of working conditions and medical care of the rural population is instrumental in lowering occupational morbidity among agricultural workers.

In view of the foregoing, it was interesting to define the main distinctions of occupational morbidity among agricultural workers in Belorussian SSR. For this purpose, analysis was made of the records on occupational poisoning and diseases in 1973-1977.

According to the processing results, the share of diseases among agricultural workers in relation to overall occupational morbidity is negligible, constituting 3.57% in 1973, 4.44% in 1974, 3.34% in 1975, 2.39% in 1976 and 3.31% in 1977. Mathematical processing of the dynamic series of indices of relativity (1973 data taken as 100) by the method of equalization (A. M. Merkov and L. Ye. Polyakov) established that the morbidity level presented a distinct tendency toward declining over the period in question.

Cases of poisoning occupy a large place in the structure of occupational morbidity of agricultural workers (74.54%), and they are followed by respiratory diseases of dust etiology (9.09%), diseases of the skeletomuscular system and peripheral nerves (7.27%), neuritis of acoustic nerves (5.45%) and other diseases (3.56%), whereas among industrial workers, the highest share in this period was referable to diseases of the skin (25.2-37.7%)

and acoustic nerve neuritis (18.8-32.2%), while poisoning cases constituted 11.3-20.3%.

Dynamics of occupational morbidity among agricultural workers  
in Belorussian SSSR

Coefficient	1973	1974	1975	1976	1977
Before equalization	100.0	78.6	64.3	57.1	92.8
After equalization	85.7	82.1	78.5	75.0	71.4

There is a certain correlation between the nature of a disease and distinctions of the work process. Poisoning is observed mainly among workers involved in treating grain with chemicals and field workers; neuritis of the acoustic nerves is encountered mostly among machine operators, and diseases of the skeletomuscular system and peripheral nerves are seen mostly among livestock workers.

Pesticides and mineral fertilizers play a large role in the etiology of poisoning: granosan (63.4%), organochloride products (7.3%), tetramethylthiuram disulfide (4.9%), ammonia and solutions thereof (4.9%), and other chemicals. In view of the fact that the cases of poisoning are related primarily to grain treatment and sowing work, the annual distribution of such cases is seasonal, with a maximum in the winter and spring.

Analysis of the causes of poisoning due to toxic chemicals revealed that, in most cases, it is attributable to inadequate mechanization of work processes and failure to adhere to safety rules: manual treatment and packaging of grain without the use of equipment for protection of respiratory organs. For this reason, acute poisoning is the most frequent form of intoxication (61.8%).

Neuritis of acoustic nerves among tractor operators is the result of long-term (15-20 years) exposure to noise, the level of which exceeds the maximum permissible one. According to the data of the Western Machine-Testing Station (Minsk), noise in the cabin of the MTZ-80 tractor (which is the most widely used model in Belorussia) constitutes up to 92-94 dBA [dB?], exceeding the maximum permissible level at frequencies of 31.5-500 Hz.

Thus, occupational morbidity among agricultural workers of this republic is characterized by the fact that it constitutes a negligible share of overall occupational morbidity and that it is gradually declining. The main distinction is that there is prevalence of poisoning in its structure, which is related to extensive use of chemistry in agriculture, on the one hand, and deficiency of technological processes and infraction of safety rules, on the other. One of the main tasks involved to lower occupational morbidity is to improve work safety, provide workers with individual protective gear, upgrade the sophistication of production and advance sanitary and hygienic education of workers.

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BOOK ON DETERMINING TOXICITY, HAZARD OF CHEMICALS REVIEWED BY KAGAN,  
SASINOVICH

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 5, 1979  
pp 58-59

[Review by Yu. S. Kagan and L. M. Sasinovich (Kiev) of the book "Ekspressnyye metody opredeleniya toksichnosti i opasnosti khimicheskikh veshchestv" by S. D. Zaugol'nikov, M. M. Kochanov, A. O. Loyt and I. I. Stavchinskiy, Meditsina, Leningrad, 1978, 184 pages]

[Text] The significant growth in number and assortment of chemicals that require toxicological evaluation and hygienic regulations has made it necessary to expedite experimental studies directed toward examining their toxicity and substantiating hygienic standards.

The book being reviewed is the first monographic summary in this field. It defines the tasks and significance of preliminary toxicological evaluation of products in the system of toxicological and hygienic investigations, and sheds light on the theoretical bases and practical importance of setting tentative standards for levels of chemicals in environmental objects.

In view of the existing situation, when toxicological studies pertaining to hygienic standards of new chemicals are lagging behind the rate of synthesis thereof, it is extremely important to use tentative safe levels, which would yield a substantial economic and social effect. It should also be noted that, in a number of cases, there is no justification for conducting a complete program of experimental studies to set standards.

The book also submits a brief analysis of rapid methods of demonstration of blastomogenic, mutagenic, embryotoxic and teratogenic effects of chemicals. The authors stress the fact that, although the express methods presently proposed are not always reliable enough, there is the prospect of refining them.

The classification of chemicals recommended by the authors for practical use, according to their toxicity and hazard, is also interesting.

Unquestionably, this monograph will be useful to all those concerned with toxicological evaluation of chemicals and hygienic standards for them.

At the same time, the book is not without some flaws. Unfortunately, it is not indicated there that "Methodological Instructions on the Use of the Estimation Method for Substantiating Tentative Safe Levels (OBUV) of Deleterious Substances in Work Zone Air" (I. V. Sanotskiy et al., 1977) have been prepared, and that a decision was adopted to approve of the OBUV as temporary hygienic standards, as well as the fact that the USSR Ministry of Health has approved the OBUV levels in work zone air for more than 50 agents.

The authors did not submit data on estimated standards of chemicals in food-stuffs, although the estimated permissible residual levels for more than 60 agents have already been approved.

With reference to the advances of Soviet scientists in the field of setting standards for chemicals in different environmental objects, the authors should have mentioned the fact that maximum permissible concentrations of toxic substances in soil are presently being set.

The authors indicate in error (page 8) that the program of studying the scope, sequence and nature of toxicological research as related to the stages of introduction of chemicals was first implemented in 1966. In actuality, the "Methodological Instructions on Setting Hygienic Standards for New Pesticides," approved in 1957, constituted the first such program.

In a brief survey of existing high-speed methods of determining the carcinogenicity of chemicals, the authors failed to mention the important works of O. P. Chepinoga (1972), G. G. Didenko (1975), G. A. Belitskiy (1977) and B. L. Rubenchik (1977).

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BOOK ON DETERMINING TOXICITY, HAZARD OF CHEMICALS REVIEWED BY  
IVANITSKIY

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYE ZABOLEVANIYA in Russian No 5, 1979  
pp 59-60

[Review by A. M. Ivanitskiy (Moscow) of the book "Ekspressnyye metody opredeleniya toksichnosti i opasnosti khimicheskikh veshchestv" by S. D. Zaugol'nikov, M. M. Kochanov, A. O. Loyt and I. I. Stavchinskiy, Meditsina, Leningrad, 1978, 184 pages]

[Text] The monograph being reviewed was published at a very opportune time. The rapid methods described by the authors for evaluating toxicity and hazard can be used extensively in toxicological and hygienic investigations. There is substantiation in this monograph of methods of mathematical forecasting of the parameters of toxicity of new agents and tentative hygienic standards for various environmental objects. They concentrated the most on tentative evaluation of industrial toxic agents. They submit the theoretical bases of express evaluation of toxicity and hazard, demonstrate applications thereof, in particular for setting tentative hygienic standards.

The book consists of five chapters. The first chapter deals with general problems of tentative evaluation of new chemicals and its role in the system of toxicological and hygienic investigations. According to the authors' recommendations, the scope, sequence and nature of toxicological, hygienic and occupational pathological investigations of new chemicals should conform with certain stages of development and introduction thereof. The second chapter discusses the status and prospects of development of tentative [preliminary] evaluation of chemicals in the light of data in the current literature. It was shown that toxicity can be predicted on the basis of physicochemical properties of chemicals. The authors describe methods of predicting certain specific effects. The third chapter deals with methods of evaluating toxicity and hazard. Convincing evidence is offered of the importance of express determination of cumulative effects. Nomograms that are of practical value are submitted. The fourth chapter discusses estimation methods of determining maximum permissible concentrations of toxic substances in air and water. The authors propose the use of original nomograms for setting tentative hygienic standards. The fifth chapter

offers an original classification of toxic chemical compounds as related to different levels of exposure.

This book can be well-used by workers at institutions of sanitation and hygiene, as a reference aid on questions of methods for predicting toxicity and hazard and determination of the main tentative hygienic standards for new chemicals, which are not adequately covered in the Soviet and foreign literature.

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## PUBLIC HEALTH

### RURAL CONCERN FOR HEALTH, ENVIRONMENT URGED

Moscow PRAVDA in Russian 4 Jun 79 p 3

[Article by A. Ayriyan, chief physician of the district hospital, doctor of medical sciences (Armash, Armenian SSR): "Preventing Diseases"]

[Text] Health Service

Immediately upon graduation from the institute A. P. Ayriyan was sent to work in the small rural hospital where he has remained to this day. In the past 20 years the hospital in the village of Armash has been transformed into a well-equipped medical institution with authoritative specialists. Its chief physician -- currently Honored Physician of the Armenian SSR A. P. Ayriyan -- has become a doctor of medical sciences, the author of 120 scientific works, and winner of the N. A. Semashko Prize of the USSR Academy of Medical Sciences.

One of the main thrusts of his research interests is the improvement of rural health and the labor and domestic hygiene of kolkhoz and sovkhoz workers.

Impressive changes have taken place in rural areas before my eyes. For instance, a quarter of a century ago our populated centers had no communal buildings. There were no shrubs or trees in the villages. The people had to go 2 kilometers for water. Infectious diseases were widespread among the people: dysentery, typhus, trachoma, diphtheria, brucellosis, and measles. This caused rural medical personnel to direct their efforts primarily toward achieving sanitary conditions.

The collective of our district hospital also made a contribution to this cause. Considerable success was achieved with the assistance of party and soviet organs and kolkhoz and sovkhoz directors. A 35-bed hospital has now been built in the district instead of a 10-bed hospital. The hospital has its own X-ray and physiotherapy offices, a clinical and diagnostic laboratory, polyclinic and pediatric consultation facilities, a pharmacy, and dairy kitchen. We also have a sanitation museum.



The villagers now live in comfortable homes with all the conveniences. New school buildings, children's kindergartens and creches, workers' dining halls, domestic services pavilions, and department stores have been built here. In the evenings fires burn in rural culture clubs.

All these social achievements have led to an improvement in many qualitative indicators of the state of the local residents' health. In particular, child and general mortality have declined, many infectious diseases have been eradicated, and the average lifespan has increased.

However, the new working and domestic conditions also generate their own social and hygiene problems. There are fewer and fewer areas which have not been touched by the consequences of technical progress and man's economic activity. The chemization and mechanization of agricultural production parallel with beneficial changes in the people's lives and work have also introduced certain amendments to the list of illnesses -- it is now approximately the same as the city. The number of diseases stemming from unfavorable environmental factors has risen against a background of a significant reduction in many epidemic diseases in rural areas. For example, one can include allergies and toxic hepatitis.

It has become necessary to study such a "redislocation" of diseases and seek the laws which explain why patients with a pathology which was previously encountered extremely rarely in the village are appearing against a background of improving living conditions and medical assistance.

Recent research convinces us that certain diseases among rural residents are related to the state of the natural environment to some degree or other.

This means it is important in the village as well to be concerned about protecting the external environment from pollution. We must make sanitation control even more rigid, improve agricultural working conditions, and develop and implement prophylactic measures.

It is now not enough for us rural medical personnel to be competent in our own basic specialty and to master modern methods of diagnostics and treatment. We must be well informed about the changes taking place in the lives and working conditions of rural people. Our prime duty is active sanitation-education propaganda, hygiene education of the people, and improvement of the ecological level of the population. In the district we are continuously occupied with this matter.

Chemical fertilizers and plant protection agents elevate the level of farming and promote high and stable yields. We must make each rural resident aware that these preparations can be of great benefit, but can also turn into a source of danger to health if the technical rules are not observed during working hours.

In our country great attention is being paid to the health protection of persons working with toxic chemicals. The use of pesticides is authorized only after careful medical examination, special directions, instruction in hygiene, and the obtaining of special certification. Scientists are creating and introducing into practice new, less and less toxic preparations. Their use is allowed only with the permission of the USSR Ministry of Health. Strict sanitation rules for the storing, transporting, and utilization of toxic chemicals in agricultural production have been developed. The on the spot observation of these rules is the basis of safety and the main prerequisite for avoiding the harmful effect of chemicals on man and his progeny.

In short, we must fear not the toxic chemicals, but their improper use and violation of the established rules of personal and public hygiene. This depends both on the rural workers themselves and on medical personnel and equally on farm directors. The question of their personal responsibility must be raised in particular. They must clearly present the hidden danger of chemical preparations used in ignorance. The safety technology service in agricultural production should pay special attention to adherence to the rules of using and transporting toxic chemicals and fertilizers.

I think that the time has come to include on the staff of if only large-scale farms the position of deputy sovkhov director or deputy kolkhoz chairman for a medical-sanitation unit. The duties of such an administrator, who would have a medical education, must include overseeing the protection of the environment and health of rural workers. These medical cadres today are also needed in agricultural production just like the physicians already working in industry.

Once we medical workers, party and soviet workers, and the directors and community of kolkhozes and sovkhoves through joint efforts strive for and achieved satisfactory sanitation in the village and the eradication of infectious diseases among the local population. Today we must also struggle all together for the purity of the reservoirs and the air and for universal execution of existing laws and, if it can be so expressed, to eradicate ecological thoughtlessness and ignorance, nonchalance, and indifference.

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## SPACE BIOLOGY

### RESEARCH FOR FARMING IN SPACE REVIEWED

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 11 May 79 p 3

[Article by P. Pelekhov: "Heavenly Seedlings"]

[Text] Pointing to his "plot in space" before the television camera, with its faded cucumber seedlings, Valeriy Ryumin sadly quips:

"Space is indeed, as Kovalenko said, a place where only cosmonauts can live. This is the second time that I have planted seeds, and the result is the same: as soon as what nature put in the seeds is gone, growth stops and the plant dies!"

I listened to him and recalled the words of Prof Boris Grigor'yevich Kovrov, doctor of biological sciences and laboratory head at the Institute of Physics, Siberian Department of the USSR Academy of Sciences:

"The time will come when designers and engineers will say to us biologists, 'here is a place for greenhouses and here is all the energy you need, now you can proceed and turn from experimentation to the real thing. And now is the time to start getting ready for this'...."

Prof Kovrov cited quite a few examples of what is being done on earth for space "oases" of the future. The fact of the matter is that the agricultural crops that are being raised extensively in the fields, truck gardens and even the most productive, even those raised in hothouses under artificial light, with a specially selected nutrient medium for space greenhouses, are still not economic enough. We have to search. And the search has not been fruitless. For example, we succeeded in developing a variety of wheat that would yield in an artificial medium 250 centners per hectare in 65 days! He immediately pointed to the fact that this is a strictly hothouse "product," an example of highly automated production, rather than agriculture. But this is not the essential factor: it has been proven under ground-based conditions that it is possible to develop crops with a fantastic harvest. At the same time, the road toward space greenhouses has not yet been laid. A. A. Lopskiy, candidate of medical sciences, who is one of the individuals who is dealing with biological experiments in space, tends to believe that the "sentence" of the flight engineer aboard the Salyut-6--

Soyuz-32 orbital complex is not the final word. It is not only cosmonauts who can live or are living in orbit. Plants live there also, but it is too early to send the "miraculous wheat" into weightlessness. For the time being there is no guarantee that it would produce grain there.

The first questions posed by nature to biological experiments in orbit are almost as simple. The first of them is how weightlessness would affect development of a living thing.

Rather comprehensive studies were conducted aboard the Salyut-4 station with the Oasis system. It was found that plants develop rather well from seeds, form stalks and leaves in weightlessness. In a word, they undergo what is called the vegetation phase. But later, development is arrested.

This was the first and very cautious conclusion derived from the experiment. The beachhead for answering the main question of science is being prepared with great caution and meticulousness: why, when and how does weightlessness affect living things?

The "experiment" involving cucumber planting, which yielded a negative result, was more psychological than scientific. The crew members enjoy performing biological experiments as requested by scientists and, with equal pleasure, rushing the event, they organize and implement their "biological program."

For example, experiments begun with onions by the preceding crew of Salyut-6 station are continuing. It was found that the situation appeared better with onions. The onions grew and even yielded a seed pod. But the scientists are not laboring under any delusions. In the first place, there are tremendous reserves for growth and plant development in an onion. In the second place, the studies conducted on the fine cellular level showed that not all is well here either. There was a change in shape and size of the cells, and in their nuclei. Weightlessness influences plants. It is now becoming increasingly obvious. It is time to pose the next question: when, at what stage does this mechanism of influence begin? Judging from the external signs of plant development, absence of gravity begins to have an effect at the final stages. But in order to become convinced that this is so, studies must be also pursued at the previous, early stages of development. For this purpose, an instrument, named the "biogravistat," about the size of a medium cooking pan, was developed at the Institute of Botany, Lithuanian Academy of Sciences. The task for the cosmonauts is to switch the motor of the "biogravistat" on in accordance with a specified program, then to moisten (or soak) the seeds with water. A centrifugal force develops on the rotary disk of the "biogravistat," which equals the force of earth's gravity. The scientists are concerned with the early stages of growth: appearance of rootlets and first sprouts. The cosmonauts repeatedly informed earth of their observations. The most interesting finding is probably the fact that the seeds sprouted on the centrifuge.

The program of biological experiments in orbit has two main goals. First, to obtain information of interest to basic science, information that would make it possible to gain deeper understanding of the mechanism of function of extremely complex living systems. Second (which would apparently be inconceivable without the "first"), to develop a system of regeneration and a life support system based on biological principles. At the present time, scientists are posing questions not only to weightlessness. After all, an orbital complex is more than weightlessness. It is an artificial environment. The atmosphere is artificial, as well as lighting, and, finally, it involves forced, artificial cleaning of the atmosphere, and we cannot rule out the possibility that for man to live next to plants in a closed area is by no means an ideal association. In other words, there are many problems.

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## SURGERY

### ULTRASONICS INTRODUCED TO VASCULAR SURGERY

Moscow IZVESTIYA in Russian 1 Jun 79 p 3

[Article by Special Correspondent S. Tutorskaya: "Healing Arteries"]

[Text] Yuriy Ivanovich Morozov, clinic director at the surgical hospital of the Smolensk Medical Institute, has a long conference table in his office. Bundles of letters blanket the table such the latter could not even be seen. Each bundle bears a note in the surgeon's handwriting indicating the response to be made: "Make an appointment," "Get more examination data," "If the indications are present and age is not an obstacle, surgery must be performed." What was the reason for such a flood of letters?

Arteries are the most important lines of communication in the body. Through them, blood carries needed nutrients and oxygen to each cell. Inflammation may be initiated in these vessels by the action of trauma, chemical irritation, or some other cause. Some causes lead to formation of an atherosclerotic thrombus, while others elicit growth of connective tissue. But the result is the same: The artery gets plugged.

Both diseases--atherosclerosis and endarteritis--have recently started to afflict people much more frequently in their prime, during the productive time of their lives. Far from all causes of this are clear as yet. Therapy is not always effective. Moreover even surgical methods are of no help if tiny vessels of the foot and shank are diseased.

Until recently, the only way to treat atherosclerosis was mechanical--for example, removal of a thrombus if it occludes the portion of an artery from the thigh to the shank. Totally unviable portions of the vessel are removed and replaced by a shunt--a plastic prosthesis.

But now medicine has ultrasound at its service. Its uses in medicine are astoundingly diverse--from investigating the heart to pulverizing kidney stones and healing infected wounds.

Scientists of the MVTU [Moscow Higher Technical School imeni N. E. Bauman], where physicians, mathematicians, biochemists, and "pure" physicists and

power engineers work enthusiastically shoulder to shoulder, have developed new methods for using ultrasound in medicine in the last 16 years. A public scientific council has been created. In one of the council meetings Academician G. Nikolayev, rector of the MVTU, said in particular that the leading medical collectives were beginning to separate soft tissues of different densities (wherever this is necessary) with the help of ultrasound. But what about trying to use ultrasound to remove an internal injured layer directly, together with a thrombus? After all, a diseased tunica does become more dense, and the thrombus is attached to it securely. This idea was first suggested by Academician B. Petrovskiy. Animal experiments were started at his All-Union Scientific Research Institute of Clinical and Experimental Surgery.

The technical aspects were handled by MVTU colleague G. Savrasov and Professor State Prize Laureate V. Loshchilov. Responsibility for the medical aspect was assumed by professors of the VNIIEKh [All-Union Scientific Research Institute of Clinical and Experimental Surgery]--V. Petrov, O. Belorusov, and others.

Many problems arose. How can ultrasonic oscillations be suppressed within the vessels? Vessel parameters were studied, the data were fed into a digital computer, and the approximate characteristics that the new instrument must possess--form, length, flexibility--were obtained. Because the vessel and, we should add, the patient are made of delicate, brittle material, it was decided to transmit only longitudinal oscillations through the waveguide. But what should the maximum and minimum values of these oscillations be?

It was revealed during the research that a sclerotic thrombus separates rather easily together with the tunica interna. Making an incision in just one place, the surgeon could remove a thrombus of rather large size. And what is the most interesting is that the tunica interna subsequently heals. Thus the vessels resurrects itself.

The URSK-7N ultrasonic oscillator, intended specifically for vascular surgery, was made by scientists of the MVTU together with specialists of the USSR Ministry of Public Health's Institute of Medical Technology.

But were we to return to our history lesson, we would now find ourselves ready to take the most important step--emergence of the new method out of the laboratory, where it had been tested out many times, and into the clinic. Everyone understood that this would be a major leap. Who would take it? The well known surgeon Doctor of Medical Sciences Yuriy Ivanovich Morozov was such a person.

Yuriy Ivanovich immediately recognized the merits of the new instrument. He noticed that the waveguides made by scientists of the MVTU had no cutting or traumatizing edges at all. On the other hand the force with which ultrasonic energy separates away the diseased layer of the vessel was significantly

lower than the mechanical force a surgeon applies with the conventional technique. This was most important: The less the vessel is traumatized, the lower is the danger of a new thrombus forming.

Yuriy Ivanovich has completed more than 40 such operations as of today.

I was recently fortunate to attend one such operation in Smolensk. Two days before the operation, during the morning rounds Yuriy Ivanovich stopped beside the bed of patient N., examined him, and asked him calmly, matter-of-factly: "Well, how does Friday sound to you?"

The patient was beside himself with joy. The operation was the last hope for saving his leg. The doctors placed this young man, a pilot, on the disabled list at age 39. And the word "amputation" had dropped several times in the conferences like the blade of a guillotine: The toes were already beginning to lose their life, and gangrene was setting in.

And so, before long it was Friday, surgery day. It was eleven in the morning. The patient was in a deep sleep. Anesthesiologists were bustling near his side. And beyond a sterile curtain a surgical team worked in an aseptic environment. This operation is impossible without special binocular spectacles. The field of vision is smaller, but magnification is greater--up to 60x. Great precision and delicacy of actions were needed. Even the surgeon's assistants were the best in their fields. The three assistant surgeons had to work as a single harmonious orchestra.

The surgeon found that the aorta was completely overgrown by scar tissue immediately above its origin. Severe endarteritis. Ultrasound would not make it through. That meant the scalpel. Then followed a series of delicate jeweler's movements to separate the scar tissue away and remove it from the aorta. Finally the vessel canal was opened.

The nurse brought the surgeon the waveguides, and he selected the instrument of the required diameter. The URSK-7N oscillator was turned on. The surgeon checked the ultrasonic oscillations to make sure their magnitude was correct. Then he smoothly introduced the waveguide rod into the artery. But it did not go far. Again the vessel was blocked by scar tissue. Again the meticulous cleaning. After this, the surgeon was ready to penetrate rather deeply and remove the thrombus. In order that the waveguide could do its job, the diseased tunica interna of the vessel first had to be separated away and tied securely to special ring at the end of the waveguide--the so-called "Petrovskiy Scoop."

Had this been a "simple" case--obliterative atherosclerosis--everything would have been by far easier. The waveguide could have been passed throughout the entire diseased portion of the artery in just a few seconds. In some operations the surgeons immediately extracted the inner wall of the vessel together with the thrombus totaling up to 50 centimeters long. But nature is full of mysteries, and it does not afford us "simple" cases.

Rough though the analogy may be, the work now came to resemble tunneling through a difficult drift in a shaft. Layers of yielding earth alternated with layers of solid rock.

Finally the channel of the artery was freed. Now the surgeon had to sew up the incisions and patch them with tissue taken from the patient himself. The sutures on the vessel had to be especially strong and fine. The cuts were sewn together with a barely visible blue nylon thread.

Now what? Restore the circulation? No, still too early. Leg tissues had suffered insufficient circulation for a long time, and the blood in them had accumulated large amounts of waste. The surgeon first had to connect the artery and vein in the leg to a system that removes poisons from blood and tissues--a hemosorption machine. It is also known as an "artificial liver." The machine and the specialist working it were from the hemosorption center of Moscow Medical Institute No 2. He needed about 20 minutes to remove the wastes from the leg. Only after this could the artery and vein be returned to their rightful places in the circulatory system.

Everything was in order. Circulation was restored throughout the entire bloodstream, and pulsation was normal.

The team was tired. The operation took about three and a half hours. Yuriy Ivanovich left to "wash up." Specialists monitoring hemosorption and anesthesia were still working. The assistants were also busy applying the last outer sutures. On awakening, the patient would have no idea of the drama and difficulties the team of physicians experienced in their journey along the diseased vessel. He might even never know that the road to his recovery was laid not by independent hobbyists but by the collectives of several institutes.

The work of the surgical team was the apex of an entire pyramid having research by physicists, computations by mathematicians, and the labor of engineers and workers at its base. You will never see these people in the clinic. But it is owing to them that a week later the pilot will begin to walk about the ward and that more and more optimistic notes will be entered into his disease history.

At the time of my departure from Smolensk patient N. was feeling completely well. After routine rounds of the clinic Yuriy Ivanovich confessed that it was difficult. Intolerably difficult to turn people away, even if they request surgery without the direct indications present.

There is only one solution--to develop vascular surgery. We must obviously think about introducing ultrasonic techniques into vascular surgery more broadly. The VNIIEKh has now been joined in its work by USSR Academy of Medical Sciences Academician V. Savel'yev's clinic in Moscow and by the Institute of Transplantation and Synthetic Organs. In all, these clinics have performed more than 50 operations.

Of course mastery of the new method requires persistence and a certain level of skill. Even so, as A. Troshin, director of the vascular surgery department of the Institute of Transplantation and Synthetic Organs said, switching to ultrasonic technology feels like switching from a truck to a sportscar.

As with the steering wheel of a fast car, one does not place an ultrasonic waveguide into inexperienced hands. Moreover the general skill level of a surgeon performing operations on vessels must be rather high. We obviously need a special center of vascular surgery and therapy. It should make broad use of the most diverse methods, including ultrasonics. Where this center is located is unimportant. The main thing is that the people working in it--the therapists, surgeons, engineers, and physicists--would be enthusiastic about their work and that it would be sufficiently well equipped. Many, many people writing to Moscow and Smolensk from all corners of the country will express their thanks.

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## SURGERY

### CHEMICAL FIBERS USED FOR THERAPEUTIC, PREVENTIVE PURPOSES

Moscow PRAVDA in Russian 26 May 79 p 6

[Article by Correspondent V. Senin: "Therapeutic Fibers"]

[Text] The professor literally darned the injured eye, sewing the living tissue with a needle about 4 millimeters long and thread with the thickness of a human hair. The operation was successful, but I could not keep from thinking about the sutures and knots left on the surface of the eye. Could you imagine the pain if a cinder happens to get into the eye?

"That was not silk but a biologically active substance capable of dissolving in the body," explained Prof P. I. Lebekhov. "Moreover the material is even antibacterial, which keeps the injured area from becoming inflamed."

Doctor of Medical Sciences P. I. Lebekhov and his colleagues at the eye hospital in Mokhovaya, used by the ophthalmology department of the Leningrad Institute for Advanced Training of Physicians, are making increasingly broader use of special-purpose chemical fibers in medical practice. They have found application not just in eye microsurgery alone. Materials are now available that can stop bleeding and relieve pain. We are now producing fibers that liquefy blood, and even radioactive fibers.

This all began more than 15 years ago. It was precisely then that Soviet specialists obtained the antimicrobial fiber letilan out of polyvinyl alcohol for the first time in world practice. Letilan is an acronym for Leningrad Textile Institute and Latvian SSR Academy of Sciences. It was precisely as a result of creative cooperation among Leningrad and Latvian scientists, doctors, and producers that a material that has achieved such broad recognition and produced numerous progeny came into this world. Threads used for suturing in operations, vascular prostheses, and packaging material that protects perishable products--such is the range of their application.

"What doctors needed first was thread that was neutral in relation to tissue," explained Doctor of Medical Sciences F. V. Ballyuzek. "Such a material--polymer fibers--was invented after a long search. Experiments demonstrated that they could serve their purpose for many years. But this turned out to be not enough. Artificial blood vessels similar to real ones were needed. Thus surgeons once again turned to the textile producers and chemists for help. Materials with various therapeutic properties appeared in the course of the joint search."

Prof F. V. Ballyuzek chairs the department of hospital surgery of the Leningrad Medical Institute of Sanitation Hygiene. The department has long been making practical use of special-purpose fibers, replacing tissues or parts of organs by them in complex operations. Together with other specialists in the department, F. V. Ballyuzek conducts experiments in the institute's experimental laboratory on the use of special fibers, which is important in organ transplants.

"As a rule an organ taken from a donor is alien," Feliks Vladimirovich explained. "To fight it, the patient's body produces antibodies and 'assassin' cells. They attack the tissues we try to adapt to the body, and they cause rejection of the transplanted organ. Our task is to prevent such a 'border conflict.' Once again special fibers come to the rescue. Experiments on animals showed that they are highly effective in such situations."

Such fibers are also an excellent material for making blood vessel prostheses. They in a sense scare away cells trying to "grow their way" into pores in the artificial tissue. Scarring is averted as a result, and the elasticity of the synthetic artery is fully retained.

Under the guidance of Prof L. A. Vol'f, scientists in the problematic laboratory of the department of chemical fiber technology of the Leningrad Institute of Textile and Light Industry imeni S. M. Kirov are creating materials for medicine. One of the problematic laboratory's new items is fibers made from the salts of alginic acid, which is found in algae. Such fibers dissolve in water and are absorbed by the body better than many others, they promote blood coagulation, and they are easily sterilized.

The laboratory was also responsible for the birth of materials intended for protecting people working with toxic preparations. There are fibers capable of suppressing pathological fungi and bacteria. Surgical gowns, special underwear, and dressing materials are already being manufactured from such materials. Their range of application is expanding with every year. Redoxites--electron-exchange materials capable of affecting electrically charged particles--have been tested in practice. They will find their place in polygraphy and in photographic paper and film industry. One need simply pass spent solution through redoxite fabric to precipitate out silver and other valuable metals. Electron-exchange materials are used to remove traces of chlorine from water and to extract fluorine, bromine, and iodine from solutions. They are irreplaceable in antibiotic purification.

## SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

### REGULAR MEETING OF THE COUNCIL OF CEMA COUNTRY DELEGATES ON THE PROBLEM 'DEVELOPMENT OF THE SCIENTIFIC GROUNDS OF ERGONOMIC NORMS AND REQUIREMENTS'

Moscow *TEKHNICHESKAYA ESTETIKA* in Russian No 5, 1979 p 23

[Article by B. V. Puryshch, VNIITE]

[Text] The Council of Delegates (SU) held its fourth meeting in Sofia (Bulgaria) on 4-8 December 1978, with representatives from Bulgaria, Hungary, the GDR, Poland, the USSR, and Czechoslovakia taking part.

The meeting was attended by Bulgarian State Committee for Science and Technical Progress Assistant Chairman L. Dachev and Comrade Badamgarav, an expert of the CEMA Secretariat Division of Scientific-Technical Cooperation.

V. M. Munipov (VNIITE) [All-Union Scientific Research Institute of Industrial Design], director of the Coordination Center (KOTs) presented information on progress in scientific-technical cooperation on the problem "Development of the Scientific Grounds of Ergonomic Norms and Requirements" and the results of the Third International CEMA Conference on Ergonomics (August 1978, Budapest, Hungary), noting that a significant amount of work has been done on all topics foreseen by the program of scientific-technical cooperation in 1976-1978. The attention of the delegates was turned in this connection to the need for making broader practical use of the results today. Considering that cooperation on the problem has entered its decisive stage, the SU recommended that the delegates of the participating countries assume special control over completion of the projects and their introduction into the national economy. It was also decided on the basis of the discussion of this problem to ask the CEMA Secretariat to examine, jointly with the Permanent Commission for Standardization, questions concerning the directions the KOTs is to take beginning in January 1979 in its work on draft CEMA standards with the goal of including ergonomic requirements in them.

The meeting participants also discussed proposals by the Soviet delegates on the "Basic Directions of Scientific-Technical Cooperation Among the Organizations of CEMA Countries on the Problem 'Development of the Scientific Grounds for the Norms and Requirements of Ergonomics and Industrial Design' for 1981-1985" (V. M. Munipov, VNIITE), which suggested the wording of the topics and

contained tentative ideas on ways for achieving equal distribution, among the delegates, of organizational functions in support of the cooperative work on the topics:

- Topic I. Development of Fundamental CEMA Ergonomic Standards.
- Topic II. Development of Standards on Economic Norms and Requirements.
- Topic III. Development of Standards Establishing the Nomenclature of Ergonomic Quality Characteristics, as Well as of Standards Spelling Out the Procedure, Criteria, and Methods for Evaluating Product Quality From the Standpoint of Ergonomics.
- Topic IV. Development of General Principles for Creating and Operating an Ergonomic Data Bank.
- Topic V. Development of the Scientific Grounds of Industrial Design Norms and Requirements.
- Topic VI. Development of Methodological Problems Concerning Ergonomic Research on New Forms of Labor.
- Topic VII. Development of the Ergonomic Grounds for Planning Workplaces and the Working Conditions for Persons With Reduced Working Ability.
- Topic VIII. Development of Standard Training Programs, Lecture Courses, and Training Manuals on Ergonomics.
- Topic IX. Development of Problems Concerning Mutual Relationships Between The Social and Economic Impacts of Introducing Ergonomic Achievements Into the National Economy.

The Soviet proposals were unanimously approved and adopted as the grounds for further work. The delegates were instructed to ask competent agencies in their countries to continue scientific-technical cooperation on ergonomic problems in 1971-1985, and to consider the suitability of broadening this cooperation on problems in industrial design. A recommendation was made to submit, to the KOTs prior to 1 April 1979, official proposals on topics for cooperation and the distribution of responsibilities for organizing work on individual topics, such that the KOTs would be able to finalize the "Basic Directions for Scientific-Technical Cooperation Among the Organizations of CEMA Countries on the Problem 'Development of the Scientific Grounds for the Norms and Requirements of Ergonomics and Industrial Design' for 1981-1985."

The SU reviewed and approved the list of members of the central scientific editorial council and the author collective for the fundamental manual "Ergonomics. Principles and Recommendations," and the work plans of the KOTs and the Scientific-Technical Council (NTS) for 1979. The SU approved, with additions and amendments, proposals by the delegates on cooperation in

the training of scientists and their upgrading within the framework of the "Development of the Scientific Grounds for Ergonomic Norms and Requirements" problem for 1979-1980, and it asked representatives of Bulgaria, Hungary, and Poland to give reports, in the next meetings of the NTS and the SU, on the status of training personnel for ergonomics and of advanced training of other specialists in this area, and to develop the corresponding training programs.

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## SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

### SIXTH MEETING OF THE SCIENTIFIC-TECHNICAL COUNCIL ON THE PROBLEM 'DEVELOPMENT OF THE SCIENTIFIC GROUNDS FOR ERGONOMIC NORMS AND REQUIREMENTS'

Moscow *TEKHNIЧЕСКАЯ ЭСТЕТИКА* in Russian No 5, 1979 pp 22-23

[Article by L. I. Koncha, VNIITE]

[Text] The Scientific-Technical Council (NTS) on the Problem "Development of the Scientific Grounds for Ergonomic Norms and Requirements" held its sixth meeting at the Industrial Design Center in Moscow on 20-24 November 1978. Representatives of Bulgaria, Hungary, the GDR, Poland, the USSR, and Czechoslovakia took part in the conference proceedings. The Soviet delegation included specialists from the VNIITE [All-Union Scientific Research Institute of Industrial Design], the MGU [Moscow State University], the USSR Academy of Sciences Institute of Psychology, and the Scientific Research Institute of Labor. Specialists from the USSR Academy of Sciences Institute of History of Natural Sciences and Engineering and other institutions also took part in the conference.

The principal objective of the meeting was to discuss the results of research on the following topics: "Development of Theoretical and Methodological Grounds of Ergonomics," "Development of the Scientific Grounds for Ergonomic Evaluation of the Quality of Industrial Products and for Standardization of Ergonomic Norms and Requirements," "Development of Ergonomic Requirements on Information Display Hardware for the Human Operator," "Development of a Single Complex of Methods and Apparatus for Ergonomic Research in Laboratory and Production Conditions Using Computers, and Unification of the List of Ergonomic Characteristics," "Ergonomics. Principles and Recommendations," and "Investigation of the Socioeconomic Effectiveness of Introducing the Achievements of Ergonomics Into the National Economy." The results of research on the topic "Development of Ergonomic Criteria for Optimizing 'Man--Implement of Labor--Production Environment' Systems" had been discussed in the fifth meeting of the NTS (Czechoslovakia, Prague, June 1978).

A report on the results of research on the topic "Development of Theoretical and Methodological Grounds of Ergonomics" was given by I. N. Semenov, a representative from the VNIITE, the principal organization for this topic. The Scientific-Technical Council approved the work done and emphasized the

importance of the methodological developments, since they will be utilized in research and planning as well as in reaching decisions concerning control of development in ergonomics. Heeding the opinions of dissenters (F. Makher--GDR, and M. Bauer--Czechoslovakia) the NTS adopted a number of decisions aimed at implementing the fundamental premises of the methodological developments.

The conference participants approved a report by VNIITE representatives V. Danilyak and V. Oshe concerning the results of research on the topic "Development of the Scientific Grounds for Ergonomic Evaluation of the Quality of Industrial Products and for Standardization of Ergonomic Norms and Requirements." It was noted in this case that research on this topic has promoted initiation of work directed at standardizing ergonomic norms and requirements in the countries working on the problem. The following are to be developed cooperatively by 1980:

A plan for a program to develop CEMA ergonomic standards (Bulgaria, Hungary, GDR, Poland, USSR, Czechoslovakia);

materials for CEMA standard drafts;

methodological materials to support ergonomic evaluation of the quality of industrial products (Bulgaria, GDR, Poland, USSR);

the methods for creating ergonomic certificates for machines, production processes, and articles (Hungary).

Considering the great significance of unifying ergonomic terminology with the goals of placing it in order and eliminating difficulties encountered in ergonomic evaluation of articles, the council approved work done by the Bulgarian Central Institute of Industrial Design jointly with the VNIITE to create a glossary--a list of the basic terms of ergonomics.

Following discussion of the results of research on the topic "Development of Ergonomic Requirements on Information Display Hardware for the Human Operator" (V. F. Venda, USSR Academy of Sciences Institute of Psychology), the NTS approved the general conception, developed by the principal organization for this topic, on planning and evaluating information displays (SOI) and classifying these resources; it also approved recommendations on improving these resources for the purposes of protecting the labor of operators as well as on creating integrated plans for information resources and systems intended for ASU's [automated control system] insuring a significant technical-economic impact. The NTS deemed it suitable to develop the following directions in the next five-year plan:

Development of material in support of the CEMA standard "Engineering-Psychological and Ergonomic Requirements on SOI Used by Operators to Prevent and Avert Emergency Situations in Industrial ASU";

research on the principles for designing promising information systems based on mutual adaptation of man and machine.

The Scientific-Technical Council made mention of the definite achievements enjoyed by organizations collaborating on the topic "Development of a Single Complex of Methods and Apparatus for Ergonomic Research in Laboratory and Production Conditions Using Computers, and Unification of the List of Ergonomic Characteristics" (principal organization--the NGU). During the period of collaboration these organizations created multipurpose experimental stands intended for analysis of different work operations and actions (for example a stand for studying instrumental three-dimensional motor habits, a stand for quick evaluation of functional states during work, and so on). The NTS noted the suitability of developing a plan for an ergonomic laboratory which would contain a series of unified instruments, to be used for evaluation and ergonomic research in production conditions. The Hungarian Institute of Standards and the Institute for Organization and Computer Technology in Machine Building and Metallurgy volunteered to develop the plan for the ergonomic laboratory, with a consideration for proposals by collaborating organizations, in the third quarter of 1979. The Scientific-Technical Council supported a proposal from the delegates for establishing business ties with the KOTs [Coordination Center] on the problem "Creation of Biomedical Instruments and Apparatus for Scientific Research and Clinical Medicine."

On discussing progress in preparation of the basic manual "Ergonomics. Principles and Recommendations," the Scientific-Technical Council approved the composition of the collective of authors that are to write it, and it suggested that the principal organization for this topic, the VNIIE, elaborate upon the requirements on the deadlines, volume, and format for contributions to the manual.

The Scientific-Technical Council approved the directions and results of work done by collaborating organizations (the Bulgarian Scientific Research Institute of Ergonomics and Organization in Machine Building and the USSR Scientific Research Institute of Labor) on the topic "Investigation of the Socioeconomic Effectiveness of Introducing the Achievements of Ergonomics Into the National Economy" and recommended that research on this topic be tied in with work aimed at arriving at an ergonomic evaluation of the quality of industrial products, production processes, and cultural and personal articles, and that consideration be given to research by economic organizations collaborating on the general problems concerning the socioeconomic effectiveness of new equipment and concerning evaluation of scientific-technical progress.

The conference participants unanimously approved a communication by KOTs director V. M. Munipov concerning the Soviet delegation's proposals pertaining to the plan "Basic Directions for Scientific-Technical Cooperation Among the Organizations of CEMA Countries on the Problem 'Development of the Scientific Grounds for the Norms and Requirements of Ergonomics and Industrial Design' for 1981-1985."

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MYCOLOGY SECTION OF THE SIXTH DELEGATE CONGRESS OF THE ALL-UNION BOTANICAL SOCIETY

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian No 2, 1979 pp 167-168

[Article by M. K. Khokhryakov, All-Union Institute of Plant Protection, Leningrad, submitted 16 Oct 78]

[Text] The 6th Delegate Congress of the All-Union Botanical Society convened in Kishinev on 12 to 13 September 1978. A total of seven sections was organized, including a mycology section. More than 50 people from 20 cities of the Soviet Union attended sessions of this section. The section participants represented 22 scientific research institutions and 10 VUZ's from 9 Union republics.

The first session of the section was dedicated to Prof Apollinariy Semenovich Bondartsev, doctor of biological sciences and honored scientist. All of the papers delivered at this meeting dealt with problems of systematics of higher basidiales mushrooms [fungi]: "Phylogenetic Relations and Main Evolutionary Tendencies in Mushrooms of the Order Aphyllophorales," by Yu. P. Cherotchenko; "Systematic Place of Some Basidial Macromycetes in the Light of Chemotaxonomic Data," by Yu. P. Cherotchenko; "Intraspecific Differentiation of *Fomitopsis Annosa*," by S. F. Negrutskiy, and "Problems of Generic Systematics of Cuban *Polyporus*," by M. A. Bondartsev and S. Herrera.

This was followed by a discussion of analogous issues referable to Agaricales fungi. M. Ya. Zerova, in her paper entitled "Problems of Classification of Agaricales Fungi," insisted on the need to break down the Agaricales order since, in her opinion, this order consists of groups of different phylogenetic origin. L. N. Vasil'yeva expounded the opposite view in her paper, "On the Need to Retain a Single Agaricales Order"; E. L. Nezdoyevskaya delivered a paper entitled "Systematics of the Genus *Cortinarius*."

At the evening session there was a discussion of the place of deuteromycetes in the overall system of fungi and some questions of taxonomy thereof. The following papers were delivered: "Place of Deuteromycetes in the system of Fungi and Current Approaches to Taxonomy Thereof," by I. I. Sidorova; "Problems of Taxonomy of Spheropsidales Fungi," by V. A. Mel'nik and G. D. Uspenskaya; "Interpretation of Systematic Place of Fungi Imperfecti," by

M. Ya. Zerova; "Place of Deuteromycetes in the Overall System of Fungi and Questions of Taxonomy Thereof," by V. I. Bilay; "Ontogenesis and Taxonomy of Deuteromycetes," by M. K. Khokhryakov.

A few papers were displayed on stands.

The summaries of the papers were published in a special collection and, in part, in the 4th and 5th issues in 1978 of MIKOLOGIYA I FITOPATOLOGIYA [Mycology and Phytopathology].

M. V. Gorlenko, who summarized the papers delivered at the evening meeting, was in favor of "formation" of the Deuteromycetes class, many representatives of which no longer have the higher stages, while some which did retain a link to such stages only form them under laboratory conditions in many cases. Moreover, in the developmental cycle of these mushrooms, the higher stage is not dominant, or else it is facultative, and diploidization of deuteromycetes presents specific features (heterokaryosis and parasexual cycle).

The participants at the sessions observed that, at the present time, intensive studies of mushrooms are under way, and they involve the use of diverse methods. The systematics of different groups are being submitted to significant revision. In addition, with regard to choice of taxonomic criteria, specialists sometimes adhere to opposing views; this is attributable, in part, to the lack or insufficiency of factual data, so that it is difficult to determine the true volume of taxons, their phylogenetic relations, geographic distribution and possible centers of origin.

The adopted resolution states that, with respect to answering questions of taxonomy of mushrooms, in addition to the main anatomical and morphological method one must make broader use of biochemical, histochemical, physiological, electron microscopy, cultures and other modern methods of investigation. One should also intensify development of problems of mycocenology, ecology and geography of mushrooms, with mapping of the ones that are of the greatest economic importance, as well as develop problems of culturing and determination of the stock of edible mushrooms, investigations dealing with protection of rare species or those that were becoming extinct, for the purpose of substantiated inclusion of some of them in the "Red Book," applying the analogous knowhow referable to studies of higher plants; it is imperative to itemize the micromycetes and macromycetes at preserves and sanctuaries. The mycologists unanimously approved of a decision of the commission on compilation of a complete guide of mushrooms of the USSR, which would also include the groups of mushrooms that are important to the national economy and man, so that specialists in medical and veterinary mycology, as well as in biological damage to materials and other branches of applied mycology, could use such a guide. It was noted that it is imperative to make a particularly comprehensive study of economically important groups of mushrooms that have not been investigated sufficiently. For this purpose, in-depth studies of a monographic nature are required, as well as intensified and planned training of highly qualified personnel. Creation and maintenance of mycological herbariums and collections of pure cultures are also very important.



After the section meetings, there was a meeting of the Scientific Council for the Problem of "Biological Bases for Wise Use, Transformation and Protection of the Plant Kingdom." As of 1978, the section of lower plants is divided into three independent sections: mycology, algology, lichenology and bryology.

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SYMPOSIUM ON GENETICS OF PLANT RESISTANCE TO DISEASES AT THE FOURTEENTH INTERNATIONAL CONGRESS OF GENETICS

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian No 2, 1979 pp 168-169

[Article by Yu. T. D'yakov, Moscow State University imeni M. V. Lomonosov, Chair of Lower Plants, submitted 22 Sep 78]

[Text] The symposium entitled "Genetics of Plant Resistance to Diseases," which was held at the 14th International Genetic Congress, graphically demonstrated the theoretical and practical importance of the question of specificity and other aspects of correlations between host and parasite, as vividly reflected by the topics of the papers.

The first researchers of immunity paid little attention to parasites, laying emphasis mainly on development of resistant varieties. After reports began to appear about the loss of resistance in the cultivars that were bred, the correlations between host and parasite became the focal point. Intensive studies began of physiological races of parasites and development of varieties that would be resistant to the virulent races. The constant appearance and accumulation of virulent strains caused disappointment with the specific resistance, which increased after publication of the works of Kh. E. van der Plank, who substantiated the conceptions of vertical and horizontal plant resistance. Researchers dealing with the nature of immunity and practical breeders again turned their attention to nonspecific resistance. There even appeared a tendency to overlook specific (vertical) resistance as having no practical value. More recently, an increasing amount of data are accumulating indicative of the fact that typical horizontal resistance of a number of varieties is indeed specific and that there are no grounds for creating artificial barriers between vertical and horizontal resistance. The first and foremost importance of questions of correlations between host and parasite and problems of specificity in theoretical and practical work was stressed by the work of the symposium. In spite of the title of the symposium, all five papers delivered, as well as the summaries of R. Nelson and E. Favre, who were unable to attend, dealt more with the genetics of virulence of parasites and genetics of host-parasite correlations than with genetics of plant resistance.

The papers of D. MacKay (Sweden), M. M. Levitin and L. A. Mikhaylova (USSR) discussed comprehensively the question of competitiveness of strains of *Puccinia triticina* and stem rust of oats in field and model populations. The authors conclude that the influence of so-called "extra" genes of virulence on viability depends on many factors, including the genotype of the host plant. In addition to the above-mentioned papers, the one presented by Yu. T. D'yakov and V. B. Kulish, who discovered diploidization of nuclei in somatic hyphae of the pathogen of phytophthora infection of potatoes and discussed its role in variability, dealt with the genetic factors of variability of phytopathogenic fungi. M. M. Levitin and L. A. Mikhaylova, who discussed the role of mutations, heterokaryosis and parasexual process on the example of many phytopathogenic fungi, consider mutations to be a most important factor of variability. D. MacKay stressed in his paper that the rate and mechanisms of parasite variability and the influence of virulence genes on general viability must be taken into consideration when preparing breeding programs.

Two papers dealt with genetics of correlations between parasite and host. J. Samborskiy (Canada) surveyed the data obtained from studies of genetic control of biochemical factors of resistance and avirulence. Using fluorescence microscopy, this author demonstrated that development of avirulent strains of pathogens of brown and stem rust of wheat is depressed at different stages, depending on the resistance gene and genetic environment into which this gene is introduced. He tends to believe that specificity is determined by interaction between the lecithin membrane of the host plant and glycoproteins of the parasite's cell wall in the course of penetration of the haustorium.

In 1959, Person proposed a scheme of parasite-host interaction based on "gene on gene" theory. Using this scheme, one can determine the presence of resistance and virulence genes in one or both partners without genetic analysis. The Person method has become very popular. So-called square grids were developed for the study of interactions. The paper of G. Sidu (Canada) dealt with theoretical discussion of the possible variants of interacting parasite and host genes within the framework of such grids, and he demonstrated that one could make a mistake in demonstrating resistance and virulence genes without the use of genetic analysis. The author also made a study of complex systems (plants infected with two strains of parasites or two parasites), and he arrived at the conclusion that such systems are the chief cause of epistatic interaction of resistance genes, which is sometimes obtained with genetic analysis.

There was an animated discussion at the end of the meeting, mainly about horizontal resistance, the existence of which was questioned by some researchers.

The symposium meeting drew a large audience from different cities of the Soviet Union and abroad. Unquestionably, the interesting papers, discussions and

contact with scientists from different countries were beneficial to Soviet researchers concerned with plant immunity.

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## PUBLICATIONS

UDC: 614.2(47+57)(049.32)

### NEW BOOK SUMMARIZES SIXTY YEARS OF SOVIET PUBLIC HEALTH

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 5, 1979 pp 91-92

[Review by G. I. Tsaregorodtsev (Moscow) of the book "60 Let Sovetskogo Zdravookhraneniye," edited by B. V. Petrovskiy, Moscow, Meditsina, 1977, 496 pages]

[Text] This book is a large collective monograph, in the writing of which several prominent Soviet medical scientists and Soviet public health organizers and administrators participated. The book summarizes the most important stages of development of Soviet socialist public health care in the 60 years of development of our country.

All of the sections of the monograph that deal with some aspect of public health are organically coordinated with the history of development of socialist society, from the earliest days of its inception to the present. The main thought in the book is referable to Lenin's principles of organization of public health care. All of the material is presented from the standpoint of Lenin's principle of party-mindedness, the principle of dialectical combination of the general, international and specific, as determined by the distinctive feature of a given period of development of our country and public health. The enormous achievements in all areas of safeguarding the health of the working people are interpreted as the result of our socioeconomic achievements, which the people accomplished under the guidance of the Communist Party. The authors demonstrate convincingly, on the basis of vast factual material (referable to economics, culture, science, sanitation, demography, etc.), that the advances in Soviet public health are the logical result of the systematic policies of the CPSU, which is constantly concerned about improvement of material well-being and rise of cultural standards of the working people, as well as safeguarding their health.

The book offers an in-depth theoretical analysis of all Party documents and materials, starting with the earliest works by Lenin and the first program of our Party, and ending with the proceedings of the 25th CPSU and the most recent decree of the CPSU CC and USSR Council of Ministers pertaining to public health, which have a direct bearing on safeguarding the health of the people, improving their well-being and culture.



We should mention in particular that the authors make wide use of the theoretical and practical heritage of the first people's commissar of health, a comrade-in-arms of V. I. Lenin, N. A. Semashko, and the book under review is being submitted for the prize named after him.

The authors and editor-in-chief are to be given much credit for the fact that they did not limit themselves to a mere summary of development of our public health service. There is comprehensive description of the current status of Soviet public health, its tasks, unsolved problems and general routes to follow for solution thereof. In this respect, this book will be of great interest to public health organizers and administrators on all levels, as well as for the broadest circle of medical workers.

We must mention the fact that the authors disclose in great depth and with good argumentation the international nature of Lenin's principles of organization of socialist public health which, of course, also require consideration of the ethnic distinctions of development of a country that has taken the road toward socialism. In this respect, the book will be of great interest to foreign readers.

Outlining systematically Lenin's principle of Party spirit and class nature of development of public health, the authors criticize some bourgeois theories of public health (antihumanistic, private entrepreneur practice, etc.).

There is an in-depth analysis in the book of the status and prospects of development of the material and technical base of public health; there is demonstration of the advances in growth of personnel, hospital bed resources, in the most important directions of therapeutic-preventive and sanitary-epidemiological services, and woman and child health care. These achievements are particularly great and impressive as compared to the distressing state of public health in tsarist, prerevolutionary Russia. In the last section of the book, the authors discuss the achievements of Soviet medical science, its inseparable and organic link with the needs of public health practice.

One of the qualities of the book is that it contains chapters (13 and 14) that discuss the role and involvement of trade unions and the Soviet Red Cross in safeguarding the health of the working people.

Let us mention an inaccuracy in the book: On page 312, it is stated that "one is becoming increasingly aware of the philosophical definition of health as a 'life whose freedom is not restricted'." As we know, K. Marx referred to disease as life with restricted freedom. But he never submitted this idea as some sort of philosophical definition. Nor could there be, in principle, a philosophical definition of health, disease, norm, as well as species, energy, substance, etc. However, that various philosophical and methodological approaches and principles can be applied to the definition of such concepts is another matter.

In conclusion, we shall stress once more that the book entitled "Sixty Years of Soviet Public Health" constitutes a comprehensive scientific summary of the richest knowhow of socialist public health; it is the only investigation in this field and, without a doubt, merits the very highest praise.

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## PUBLICATIONS

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### NEW BOOK DEALS WITH PHILOSOPHICAL QUESTIONS OF THEORY OF NORMAL IN BIOLOGY AND MEDICINE

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 5, 1979 pp 92-94

[Review by V. B. Lemus (Leningrad) and I. I. Oleynik (Moscow) of the book "Filosofskiye problemy teorii normy v biologii i meditsine," by A. A. Korol'kov and V. P. Petlenko, Moscow, Meditsina, 1977, 390 pages]

[Text] The concept of "normal" (normality) is one of the most complex ones in biological and medical science. In medicine, the word and concept of "normal" is an element of the professional vocabulary and criterion of medical thinking. Suffice it to recall how often references are made in the medical literature to the mean statistical norm, forgetting the norm of individual differences, and the orientation is usually toward heterogeneous quantitative indices without consideration of the potential reactive capabilities of the body. So often the goal of stage-by-stage therapy is considered to be normalization of the patient's indices and functions, although the optimum values thereof are rarely in the range of the so-called norm. The lack of a strict, scientifically developed definition of the concept of "norm" [or "normal"] in biology and medicine is one of the causes of such confusion and error. In this respect, the monograph of A. A. Korol'kov and V. P. Petlenko not only fills this gap significantly, but defines the methodologically most promising routes of further work on this problem.

This monograph discusses successively [systematically] the historical philosophical premises for definition of the norm, the philosophical bases of theory of normal, the evolutionary and general pathological aspects of dialectics of normal and anomalies.

An historical excursion makes up a lively and fascinating section of the book. However, as stressed by the authors themselves, its purpose is not a game of historical philosophical erudition and not an attempt at pedantic reconstruction of all stages of development of the problem. The creative function of this section is determined, in particular, by the fact that the history of the category of measure in philosophy helps understand and overcome many difficulties encountered in defining the concept of "norm" from a modern vantage point.

The authors analyzed the current status of this problem with broad coverage of scientific disciplines and other areas of life (economic, ethical, etc.), in which the concept of "norm" is used. It was established that, even in the scientific literature, the word "normal" has many synonyms (ordinary, typical, average, standard, ideal, etc.), and this reflects a basically different interpretation of the question rather than simple terminological confusion. Subsequent discussion of various methodological approaches makes it possible not only to define the most acceptable areas of application of different synonyms of "norm." At the same time, the authors disclose the sources of the mistakes that inevitably arise with arbitrary interpretation of the norm, and they also expose the soil on which idealistic theories (relativism, conventionalism and others) grow.

Of greatest interest to the medical community is the largest section of the monograph, which deals with dialectics of normal and anomalies in the pathological process. The age-old importance of this problem reflects a need of both theoretical and clinical medicine, because it is expressly disease that compels one to ponder over the substance of health and normal vital functions of man.

The authors validly stress the fact that the true contradiction between normal and pathology is not on the surface, but it is exposed only through knowledgeable dialectical analysis that permits insight into many little-studied aspects of the problem. First of all, the authors stress that the correct definition of norm in biology and medicine can be given only with due consideration of the forms of organization of a living thing and its structural and functional level. This thesis is clearly demonstrated in modern evolutionary theory, in particular, on the example of mutations as one of the causes of impairment of adaptive norm. However, on the other hand, mutations are absolutely necessary for the survival of a population under altered environmental conditions, i.e., there is a dialectical contradiction, which is inherent in any developing system, to which there can be three solutions: either mutations alter the labile adaptive norm and stabilize it, or they lead to formation of a qualitatively new adaptive norm for the species, or else they impair adaptation to such an extent that it leads to extinction of populations. The authors stress that evolution of the adaptive norm owes much to anomalies (in this case, mutations).

Developing this thought, they arrive at the conclusion that a normal living system is a system of "coadaptation," i.e., both adapted to the environment and capable of competition. For this reason, the substance of norm is determined not only by organization of a given system, but its functional role, its evolutionary expediency in a system of a higher order.

The authors' objectives did not include analysis of all of the social aspects of the problem of normal and pathology in medicine. But the material they have submitted reflects rather clearly their position on these subjects. The book discusses the biosocial structure of man, the process of socialization, the influence of methodological premises of personality theory in Marxism on

interpretation of social aspects of norm and pathology. Human disease is assessed primarily from the standpoint of its biological determination. And it is stressed that social factors may have a substantial influence on etiology and pathogenesis of a disease, but they only alter the biological bases of human vital functions.

The authors discuss, from the positions of Marxist philosophy, the ecological problem of the modern world as well, the distinctions of the socialistic conception of correlations between man and his environment, in organic connection with the above formulation of the question. Special attention is called to the fact that the rate of change in the natural and social environment may overtake evolution of adaptive capabilities of the human body. In the authors' opinion, this generates a need for a new way of thinking in medicine, population-centric thinking.

Of course, we must agree that the evolutionary approach to interpretation of health and sickness, phylogenetic and ontogenetic distinctions of pathology and adaptation must become an important feature of modern methodology of biomedical research. However, unlike biology, organism-centric thinking should not be replaced (A. S. Mamzin, 1971) by population-centric, but be supplemented by the latter. This process is already taking place. We can refer to the distinction of such a new nosological form in psychiatry as social infantilism, when formation of the personality lags behind physical acceleration. Numerous examples could be cited from infectious pathology, when the distinctions of symptomatology, pathogenesis and treatment of diseases are assessed with due consideration of expressly evolution of microbial populations. Of course, the area of possible creative application of the evolutionary approach in medicine is still very broad, and there is no doubt that the monograph by A. A. Korol'kov and V. P. Petlenko will speed up this process, rendering it methodologically more sophisticated and fruitful.

The practicing physician will undoubtedly be interested in the sections of the monograph that deal with individual criteria of human norm and anomalies, since the attention of medicine, as validly noted by the authors, is concentrated on an individual, unlike evolutionary theory which concentrates on populations and species. Individuality is viewed as a set of traits, and the authors' make a comprehensive analysis of the role of age in disease and aging.

There is much food for creative thought and discussion in the sections of the book that deal with dynamic self-regulation of functions under normal and pathological conditions. The following theses merit the greatest attention: the quality of reactions as a criterion of normal and pathology, multifactored determination of reliability of a living system--the frequent inconsistency between "normal" and optimum in the presence of disease. The view of diseases as a disorder of dynamic self-regulation of living systems as a result of typical impairment of feedback is unquestionably valid. But, in our opinion, it is not sufficient for the all-encompassing philosophical



conclusion that a "breakdown" of feedback is only one of the many typical mechanisms of general pathogenesis. It would have been desirable for the analysis of the role of self-regulatory systems in the presence of disease to have been made with constant consideration of signs of damage and protection, and dynamic delimitation of two forms of adaptation (active and passive), in the origin of which the feedback system may play opposite roles.

The authors analyze the question of quality in the presence of disease and normal vital functions in organic connection with the above-mentioned issues. At first, they substantiate the view of the body as a relatively autonomous system, the chief source of development of which is the presence of specific endogenous contradictions that are immanently linked with the structure of a given system and are the basis of endogenous causes of self-propulsion. Then, from this vantage point, there is a criticism of "equilibrium" theory, the conception of sanogenesis and others, although, in our opinion, the critical essay is too long, so that there is inevitable erosion of the author's position. In particular, there is inadequately clear substantiation of the thesis of the main endogenous contradiction in development of normal and pathological processes. The authors consider this to be the "endogenous factors of deviation from the ultimate adaptive effect," that stimulate triggering of mechanisms of compensation and restoration, by virtue of which the system returns to the specified level (to normal). They imply that normal and pathological processes are based on the same self-regulation mechanisms which, however, function in different modes.

This thesis merits comprehensive discussion. In this brief review, we must limit ourselves to only a few comments. This thesis applies to normal vital functions and to disease at the recovery stage; however, it does not disclose the internal contractions of the first element of pathogenesis, many "vicious circles" of disease ending with death, and it does not cover situations when impairment of self-regulation and even death of a living thing at the lowest level are of an adaptive significance to a higher system (for example, the body). Finally, we must mention that mechanisms of self-regulation may be formed in the presence of pathology that are different in quality from physiological ones; for example, thrombus formation as a mechanism that accelerates proteolytic dissolution of necrotic tissues, the paradoxical stage of change in vascular reflexes, etc.

It is important to mention in particular that the authors of this book have made a contribution to the critique of the numerous definitions of disease and have added one more definition though, in our opinion, it too is not flawless. We should like to stress that an important effort was made to avoid absolute contrasting of normal and pathology (health and disease are measured with the same gage, optimum self-regulation) and to cover all levels of a living system, as well as its ontogenetic and phylogenetic aspects.

On the whole, the monograph has been written in a polemic spirit. Therein lies its merit and, of course, its vulnerability.

No doubt, some of the issues raised by the authors are spectacular or even debatable; however, on the whole, this work inspires reflection. We should mention specially the good literary style of the monograph, thorough editing and good printing.

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## PUBLICATIONS

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### REHABILITATION OF MENTAL PATIENTS DISCUSSED IN NEW BOOK

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 5, 1979 pp 94-95

[Review by A. V. Shmakov (Moscow) of the book "Reabilitatsiya psikhicheskii bol'nykh," by M. M. Kabanov, Leningrad, Meditsina, 1978, 232 pages]

[Text] It can be stated without exaggeration that, at the present time, rehabilitation of mental patients has become one of the pressing problems in all developed countries. At the present time, physicians, clinical psychologists, sociologists and representatives of other specialties are involved in working on this problem. Extensive empirical material on this score has already been accumulated, but unfortunately it has not yet been submitted to proper critical analysis and theoretical interpretation in the scientific literature. In our opinion, this gap has been well-filled by the book under review. Its author analyzes the question of rehabilitation of mental patients from dialectical materialistic positions, integrating its historical and logical development, on the basis of his own data, the work of the staff of the Leningrad Neuropsychiatric Institute imeni V. M. Bekhterev and that of other scientific institutions.

The monograph consists of an introduction, 5 chapters, conclusion and bibliography of works by Soviet and foreign authors numbering 418 listings.

The introduction substantiates the practical and theoretical importance of working on the problem of patient rehabilitation under modern conditions. The first chapter describes the specific distinctions of rehabilitation of mental patients; in the author's opinion, they are determined primarily by the fact that there is serious impairment of social relations and an individual's relations with his surroundings in the presence of mental illness, more than with any other. For this reason, the author believes that rehabilitation of mental patients is primarily resocialization. He also convinces us that this is so. Indeed, the patient's personality is affected primarily in the presence of mental illness, its social ties and relations with others.

In the second chapter, the author develops his views on patient rehabilitation. For this purpose, he analyzes and appraises different approaches to this problem, defines its main concepts, defines the role of biological and social factors in the process of patient rehabilitation. He devotes special

attention to rehabilitation of mental patients in a hospital, training of physicians, nurses and all personnel for this difficult and important work. We agree with the author that the essence of rehabilitation work at a modern psychiatric hospital does not lie in the question of whether its doors are open or closed, but reorganization of its internal structure, the work style of all of the personnel.

The main theses of rehabilitation of mental patients are also expounded in the third chapter. Here the author describes the rehabilitation principles he developed, which are gaining increasing recognition both here and abroad. The first principle is the partnership principle. It is applied the most fully in the "physician--paramedical and nonmedical personnel--patient--relatives and the patient's immediate surroundings" system of positive relations. In this system are formed and manifested psychological, ethical and other forms of relations and interpersonal relations; the psychological and ethical climate is created there, and it has a definite influence on the process of patient rehabilitation. The second principle is that of diversity (different levels) of the physician's and patient's efforts in different areas of "psychosocial functioning." In the course of applying this principle to practice, the patient develops adequate forms of communication with people at work, at home, etc. The third principle of rehabilitation is the principle of unity of psychosocial and biological methods of treating a patient as an organism and personality. This principle refers to an approach to rehabilitation as not only a social problem, but a clinical one as well. Finally, the fourth principle of rehabilitation is the step principle of use of rehabilitation programs. It is physiologically substantiated by the statements of I. P. Pavlov concerning the importance of gradual use of stimuli to develop conditioned reflexes as a "fact of general importance."

The same chapter deals with the three stages of rehabilitation proposed by M. M. Kabanov: reconstructive therapy, readaptation and rehabilitation (in the direct meaning of the word). Describing them in detail, the author arrives at the conclusion that there is a specific preferred organizational form of psychiatric care at each stage of rehabilitation. Thus, reconstructive therapy should be administered at hospitals or under semi-hospital conditions. Readaptation can be implemented at both hospitals and semi-hospital institutions, as well as neuropsychiatric dispensaries with their therapeutic workshops. In the author's opinion, actual rehabilitation is feasible only under extramural conditions (work in the home, in therapeutic workshops, special shops and ordinary industrial enterprises). The author stresses that the stages of rehabilitation that he proposes constitute only a general system which, however, determines the main sequence and direction of therapeutic and rehabilitation complexes. Rehabilitation emerges both as a goal, i.e., restoration of the patient's status, a process based on psychological and neurophysiological mechanisms, and a special approach to the patient, the substance of which is described in the above-listed principles.

The purpose and program of rehabilitation are modified in each specific case, according to the existing and potential capabilities of the individual as an organism and personality.

The author believes that the problem of patient rehabilitation could be better understood in the light of current conceptions of the systems approach. In his opinion, rehabilitation "is an 'arena of systems activity,' where man (as an organism and personality) and his environment are the participants of interaction" (page 67).

The fourth chapter describes the organizational and methodological aspects of rehabilitation of mental patients, substantiates the need to establish an interagency council to coordinate rehabilitation measures and proposes new ways and means of rehabilitation therapy. In discussing these matters, the author refers to the vast knowhow in rehabilitation work accumulated at the Leningrad Neuropsychiatric Institute imeni V. M. Bekhterev, which he heads. (To read about the work done at this institute pertaining to rehabilitation of mental patients, refer to "Rehabilitation Therapy of Mental Patients," edited by M. M. Kabanov, K. V. Korabel'nikov and R. A. Zachepitskiy, Leningrad, 1977). The same chapter offers a summary on experience gained in the use of differentiated therapeutic regimens; it defines the concept of "work style" of a therapeutic institution; it discusses the ethical aspects of a psychiatric diagnosis and other questions.

In the last, fifth, chapter, there is a critical analysis of the traditional approaches used in psychiatric practice to evaluate the efficacy of therapeutic measures. There too, the author cites new criteria for assessment of the effectiveness of rehabilitation programs. He proposes that not only the clinical findings of patients, but the results of clinicopsychological and clinicosociological studies be included in the rating of efficacy of rehabilitation measures. After standardization and mathematical processing, the obtained results are used by the author as the basis for a so-called rehabilitation chart [or map]. Such investigation programs have made it possible to replace the biological model of a disease with a "mixed" model, from the standpoint of the systems approach, where the biological and social (more precisely, psychosocial) elements supplement one another.

We are unable to cover more completely and comprehensively the entire range of issues raised and disclosed in this review. Nor was this part of our task. The purpose of a review is to draw the attention of medical workers and all those concerned with patient rehabilitation to this interesting and multifaceted book. It describes much of the research, discoveries and ideas of the author. Some of the theses and conclusions may be perceived and evaluated differently by the readers. Some will agree with the author, for others, they will serve as cause for doubts, reflection and even objections. But, in our opinion, this is as it should be. After all, theory and practice of patient rehabilitation are still at the stage of inception and search for routes of development. One thing is certain, the problem of patient rehabilitation has been posed by life itself, and the book being reviewed here has made a significant contribution in this respect.

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## PUBLICATIONS

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### TOXICOLOGICAL EXPERIMENT DISCUSSED IN NEW BOOK

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian No 3, 1979 p 318

[Review by Prof I. V. Komissarov, Donetsk, of the book "Pokazateli normy i laboratornykh zhivotnykh v toksikologicheskom eksperimente" (Indicators of the Norm and of Laboratory Animals in a Toxicological Experiment) by I. M. Trakhtenberg, R. Ye. Sova, V. O. Sheftel' and F. A. Onikiyenko, Izdatel'stvo Meditsina, Moscow, 1978]

[Text] The book by Professor I. M. Trakhtenberg and his coauthors cannot help but be of interest to the pharmacologist whose work is connected with the search for medicines and, consequently, with the experimental estimate of the danger of new chemical substances. A present-day toxicological experiment in this field will undoubtedly go beyond the experience accumulated by pharmacologists.

The book gives tables of physiological, biochemical, hematological, immunological and other indicators characterizing the normal level of the functional state of the most widely used types of laboratory animals. The summary given of the functional and other parameters is fuller than those published earlier (N. P. Sakharov and coauthors, 1958; V. S. Asatiani, 1960; I. P. Zapadnyuk and coauthors, 1974).

The readers' attention is also drawn by the profound analysis of the philosophical aspects and practical approaches to the evaluation of the biological norm. The authors tend to identify the norm with a certain range of values for the characteristic being measured, which should be regarded as a confidence interval, within the limits of which the true significance of the characteristic lies with the necessary probability.

The probability approach to determining the norm and its criteria prompted the authors not only to examine the basic requirements for the choice of the animals (selection and rejection of sick animals, filtering out the animals with indicators dropping out, forming groups and statistical checking of a lack of differences between groups), but also to discuss criteria of reliability in evaluating the biological significance and variability of the characteristic. Obviously it is the first time that authors have

so convincingly substantiated the need for a differentiated approach to the evaluation of the normal fluctuations of the "plastic" and "rigid," i.e., vitally important constants of the organism, and recommended using different probability levels when evaluating the reliability of shifts for different categories of functional indicators.

The book also touches on other problems related to an understanding of the biological norm. For example: to what extent can the presence of shifts in the functional and other parameters from the normal level attest to the harmfulness of the toxic effect, and is their absence the consequence of adaptive and compensatory-adaptation reactions that disguise profound pathological changes occurring due to the effect of the chemical agent? Unfortunately, these questions are not discussed in as much depth as would be desirable.

The book introduces normal levels for certain parameters which, in view of their "superplasticity," in our opinion, do not lend themselves to norm-setting. For example, when determining the spontaneous motor activity of mice and rats (p 49), conditions are required for the experiment (sex, age of the animals, time of year and of day, temperature of the environment, preceding food and water regimen, area and volume of the actometers, etc.) that cannot be reproduced in different laboratories with sufficient precision.

Finally, in such a complete summary it would be expedient to introduce certain parameters, particularly biochemical, for animals of the most important inbred strains.

On the whole, the book being reviewed is undoubtedly a useful guide in the daily work of pharmacologists and toxicologists.

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## CONFORMATIONAL REGULATION OF FUNCTIONAL ACTIVITY OF PHOTOSYNTHETIC MEMBRANES OF PURPLE BACTERIA

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BERG, A. I., NOKS, P. P., KONONENKO, A. A., FLOROV, YE. N., KHRIMOVA, I. N., RUBIN, A. B., LIKHTENSHTeyN, G. I., GOL'DANSKIY, V. I., PARAK, F., BUKL, M. and MOESSBAUER, R., Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka Unit in Moscow Oblast (for Berg, Frolov, Khrymova, Likhtenshteyn and Gol'danskiy); Biology Faculty of Moscow State University (for Noks, Kononenko and Rubin); Technische Universitaet, Munich (BRO) (for Bukl and Moessbauer)

[Abstract] Derivative nitroxyl radicals were used as spin probes and labels in the chromatophores of *Rhodospirillum rubrum*. Redox interaction efficiency of photoreduced primary electron acceptors with secondary acceptors varies widely (from 1.0 to less than 0.2) in the -20 to -80 C temperature range. The range for the spin probes is similar. In the -80 to -130 range the activation energy of electron transfer is only weakly temperature dependent. This is also true for spin diffusion. Similar results were found for resonance absorption of the (Fe 57) Moessbauer probes. The temperature dependence of spectral shifts points to changes in pigment molecule position due to changes in the protein carrier. The efficiency of electron is fairly constant over a wide range (from  $P/P_s=0.8$  to a little over 0.2) where it increases from 0.2 to 0.2 to over 0.6). An electron conformation interaction mechanism is involved in the regulation of electron transport. This is inferred from increases in membrane protein and lipid mobility in temperature ranges where transfer efficiency increases. Rotational diffusion and resonance absorption also vary with moisture content (from 2 to 10 for the former and 0.2 to 1.0 for the latter in the 0.8 to 0.2 range). Figures 7; references 12: 9 Russian, 1 Hungarian, 2 Western.

## EFFECT OF IMMOBILIZATION ON PROTEIN (TRYPSIN) FOLDING

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 13, Iss 1, Jan-Feb 79 pp 73-80 manuscript received 13 Apr 78

MOZHAYEV, V. V., MARTINEK, K. and BEREZIN, I. V., Department of Chemical Enzymology, Moscow State University imeni M. V. Lomonosov

[Abstract] Trypsin bound to p-aminobenzyl-cellulose, sepharose, Sephadex and glass is unfolded in 8 M urea. Catalytic activity drops most rapidly on the first support, and least of all on glass. Residual catalytic activity is 90% for the latter and 100% for Sephadex G-200. Fifteen percent of the enzyme immobilized on cellulose is reactivated, the figures are 60% for Sepharose and 80% for Sephadex. Supports with higher surface areas interact with the polypeptide chain and reduce reactivation. This does not occur for polysaccharides. Reactivation is much higher (100-300 fold more than probability of the creation of the S-S bonds) when there are no thiol-disulfide exchange catalysts during folding. The role of thiol-disulfide exchange during in vitro reactivation is the limiting factor. In absence of such catalysts Sephadex reactivates much faster than Sepharose. Immobilization results in the prevention of many "non-native" conformations, restricting the number of possible folds. The presence of immobilized polypeptide chains on ribosomes indicates that this may also be a factor under in vivo conditions. Figures 2; references 30: 5 Russian, 25 Western.

## PURIFICATION OF PHOSPHATIDYLCHOLINE ON MODIFIED POLYAMIDE

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 2, 1979 pp 3-6 manuscript received 19 Oct 78

AKHMEDZHANOV, R. A., RAKHIMOV, M. M. and TASHMUKHAMEDOV, B. A., Institute of Biochemistry, Uzbek Academy of Sciences; Central Asian Scientific Research and Planning-Design Institute of the Food Industry

[Abstract] The technique for fractionating a mixture of phosphatidylethanolamine, phosphatidylserine, phosphatidylinositol and phosphatidylcholine to purify the choline derivative consists of passing the mixture through a specially modified carrier that retains pigments and phospholipids other than the choline. The purification technique is based on chemical

differences in phospholipid alcohols and the capacity of certain phospholipid alkyl residues to form covalent bonds with aldehyde groups. The phosphatidylcholine alcohol residue does not have groups capable of bonding with aldehydes or other carrier groups. The polyamide used as the carrier was modified by the addition of a 12.5% glutaric dialdehyde solution. Egg yolk phospholipids or a phospholipid mixture was combined with the modified polyamide carrier and centrifuged after 48 h. Phosphatidylcholine purity was monitored by thin-layer chromatography and by changes in phospholipid content. Maximum phospholipid bonding to the carrier occurred at concentrations of 1.2-1.6 mmol/g; higher concentrations decreased the bound P content due to alterations in the lipid micelle structure. Complete lecithin purification was achieved at 0.360-0.720 mmol based on P (per 1.0 g of carrier). With the use of egg yolks as the lecithin source, more phospholipids were bound to the carrier at lower concentrations; this is probably due to binding of egg yolk lipoproteins. The binding of proteins and pigments also decreased the carrier's capacity for phospholipids. The modified polyamide removed proteins, polyphenols, pigments, phosphatidylethanolamine, phosphatidylserine, phosphatidylglycerol and phosphatidylinositol from the phospholipid mixtures yielding a sufficiently purified phosphatidylcholine that did not require further chromatographic purification. Figures 2; references 4: 1 Russian, 3 Western.

USSR

UDC (612.34+612.33):612.47

EFFECT OF MUSCLE TRAINING AND ADAPTATION TO COLD AND HEAT ON THE ENZYMATIC ACTIVITY OF THE PANCREAS AND INTESTINAL CONTENTS OF RATS

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 2, 1979 pp 28-30  
manuscript received 30 Mar 77

ALIMKHOCZHAYEVA, CH. R. and KURBANOV, SH. K., Institute of Physiology, Uzbek Academy of Sciences; Uzbek State Institute for Physical Culture

[Abstract] Enzyme synthesizing and secreting activity of the pancreas and enzyme levels in the small intestine were studied in 144 male rats during adaptation to gradually increasing muscle loads (swimming in water), heat (40-41°C) or cold (3-5°C). Alpha-amylolytic activity decreased initially in the pancreas and in the intestinal contents during adaptation to a muscle load; on Day 20 it increased to control levels in the chyme but concentrations in pancreatic tissue were lower. Full recovery of both indices to control values occurred by Day 34. The pattern was similar during adaptation to heat, except for slight minor shifts in enzyme level dynamics in the small intestine. During adaptation to cold,



pancreatic and chyme amylolytic activity dropped sharply toward Day 13 with recovery to control levels toward Day 20. Changes in proteolytic activity were similar to those in amylolytic activity during muscle loading, but activity was stimulated in the pancreas by Day 34. During adaptation to cold and heat, proteolytic activity increased substantially in the middle of the adaptation period in the intestinal contents, followed later by phasic changes. Pancreatic lipolytic activity dropped sharply by Day 20 during muscle loading and increased substantially toward the end. There were phasic changes in the intestinal lipolytic activity. Changes in lipase activity in the pancreas and chyme varied during adaptation to heat. During cold adaptation lipolytic activity decreased in the pancreas, whereas it increased in the intestinal contents; it increased in the pancreas and chyme from Day 20. The pancreatic enzyme synthesizing system and mechanisms responsible for enzyme secretion into the duodenum react nonspecifically via the general adaptation system to unfavorable factors. Functional pancreatic disturbances lessen gradually during adaptation and changes in enzymatic activity become somewhat specific to the various effects. For example, the body weight of the animals decreased progressively to Day 13 during muscle loading and exposure to heat, followed by a gradual increase. Body weight increased slightly during adaptation to cold. Figures 2; references 4 (Russian).

USSR

UDC 615.31:576.858.6

#### EFFECT OF VIRAZOL ON MULTIPLICATION AND ACTIVITY OF RNA TUMOR VIRUSES IN CELL CULTURES AND IN LABORATORY ANIMALS

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 41 No 2, Mar/Apr 79, pp 170-175 manuscript received 17 Jan 78

SAVTSOVA, Z. D., DENISENKO, O. YU., STRUK, V. I. and LIDAK, M. YU.,  
Institute for Problems of Oncology, Ukrainian SSR Academy of Sciences

[Abstract] Virazol, which has an inhibiting effect on the replication of DNA and RNA containing viruses, was tested on several strains of virus (mouse sarcoma (MS), Rausher (R), Pliss' lymphosarcoma (LPS), and others). Two lines of mice (VALV/s, and C57VL used showed similar sensitivity). The destructive effects were greater in the control animals than in the injected ones (The polymerase indices were from 1 to 10 in the former, and not greater than 2.7 in the latter). The effect is reversible. Embryonal fibroblasts receiving a 25 mcg/ml application of MS showed a 42% reduction in viral particles after 72 hrs compared to controls. Tests on the effects on LPS differed somewhat; depending upon whether

the level of H3 uridine or that of C14 hydrolysate was used, the inhibitory effect was less for the latter. While RNA inhibition is at a maximum 24 hours after application (90%), viral particle production is only 48% reduced and does not fall subsequently. Such particles could be deficient in RNA, but contain inverse transcriptase. Virazol does not affect the inclusion of viral information in cell genomes. Viral suppression is the result of disturbances of viral RNA synthesis. The spleens of injected mice weighed almost the same as those of normal animals, while the controls (no injection) were more than twice as heavy. It is not advisable to increase the dose or prolong the treatment. Virazol could be used in combination with cytostatic preparations. Figures 4; references 13: 2 Russian, 1 Ukrainian, 10 Western.

USSR

UDC 576.312.32

CELLULAR COMPOSITION OF INFLAMMATORY EXUDATE AND GLYCOGEN IN THE MIGRATING CELLS OF HEALTHY CATTLE AND CATTLE WITH CHRONIC LYMPHOID LEUKOSIS FOLLOWING IMMUNIZATION WITH BCG VACCINE (4. GLYCOGEN IN THE MIGRATING CELLS OF ILL COWS)

Vil'nyus TRUDY AKADEMII NAUK LITOVSKOY SSR SERIYA 8 in Russian No 2, 1979 pp 113-119 manuscript received 11 Jan 78

ACHAYTE, YU. YU., SADAUSKAS, P. B., LUKSHIS, L. P. and DABKYAVICHYUS, V. B., Institute of Biochemistry, Lithuanian SSR Academy of Sciences

[Abstract] BCG is a leading stimulant of cell immunity. In this connection the change in glycogen content of the cells of inflammatory exudate before and after administration of BCG to cattle with chronic lymphoid leukosis was investigated. Samples for cytochemical analysis were obtained through erosion of the living tissue of the horns of the investigated animals. The glycogen in the cells migrating through erosion was determined upon aseptic inflammation of living horn tissue and upon application of  $30 \times 10^6$  BCG mycobacteria to the erosion. All experimental animals following the first experiment were administered 3 mg of BCG vaccine subcutaneously into the neck. The second experiment was performed 20 days following the immunization. Cytochemical analysis showed that the mean index of response to glycogen, i.e., the mean amount of glycogen per cell, was 3.5 times lower in cattle with chronic lymphoid leukosis, after immunization with BCG, especially in mononuclear cells, compared with the index for non-immunized cattle. Hence, immunization with BCG alters carbohydrate metabolism, much more in the mononuclear cells of the inflammatory exudate than in neutrophilic leukocytes. Apparently, the considerable changes in the glycogen content of the mononuclear cells of the inflammatory exudate of

BCG-immunized cattle with chronic lymphoid leukosis are partially attributable to an increase in the humoral recognition factor and the activation of the phagocytizing properties of the mononuclear phagocytes, which results in intensifying the processes of the splitting of that polysaccharide as well as in changing the enzyme systems catalyzing glycogenosynthesis and glycogenolysis. References 60: 18 Russian, 2 Polish, 40 Western.

USSR

UDC 340.624.4:612.118.221.2

**SIMULTANEOUS DETECTION OF M,N,A AND B ANTIGENS IN BLOODSTAINS BY AN ABSORPTION-ELUTION TEST**

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 22 No 2, 1979 pp 37-39

YUDINA, G. S., Scientific Research Institute for Forensic Medicine, USSR Ministry of Health, Moscow

[Abstract] A variant of the quantitative absorption method for revealing the indicated antigens with or without boiling and in dried blood was tested on 25 blood stains ranging from 1 month to 4 years since their occurrence, using isohemagglutinate serum alpha and beta in a 1:512 titer, and immunized rabbit's blood of anti-M and anti-N types. The procedures for absorption and elution are detailed for two variants of the method, the second of which was used after fixation with methanol. The second variant was found effective for the detection of M, N, A and B antigens and is more efficient since all processing can be done simultaneously. No references.

USSR

UDC 340.626.2:612.111.14-087.4:543.42

SPECTROPHOTOMETRICAL DETERMINATION OF CARBOXYHEMOGLOBULIN

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 22 No 2, 1979  
pp 39-42

BUKINA, L. P. and USHAKOVA, L. I., Leningrad Oblast Bureau of Forensic Medical Expertise; Department of Forensic Medicine of the First Leningrad Medical Institute imeni I. P. Pavlov

[Abstract] A variant of a spectrophotometrical method for determining the presence of carboxyhemoglobin in cadaver blood, which does not require saturating the blood sample with carbon monoxide for each test, was developed and tested. Fresh cadaver blood was mixed with 0.1% ammonia solution at a ratio of 0.5:100, then filtered through a glass filter under vacuum. After addition of 5 mg of hydrosulfite and thorough mixing, absorption spectrum measurements were taken. Statistical analysis of the wavelengths recorded and other data indicated that this procedure was statistically reliable and acceptable for determining carboxyhemoglobin in cases of fatal carbon monoxide poisoning. Figure 1; no references.

USSR

UDC 340.67:546.49(048.8)

COMPARATIVE EVALUATION OF METHODS FOR MEASURING MERCURY IN BIOLOGICAL OBJECTS (LITERATURE SURVEY)

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 22 No 2, 1979  
pp 42-47

KRYLOVA, A. N. and RUBTSOV, A. F., Scientific Research Institute for Forensic Medicine, USSR Ministry of Health, Moscow

[Abstract] Literature reports are summarized in categories including such chemical methods as measurement of residual mercury in incompletely decayed organic matter, precipitation of mercury iodide measured by using sodium sulfate and acetone, complete and partial mineralization of animal substances, extraction and colorimeter measurements of the reaction of mercury with dithisone or tetraiodomercurate, atomic absorption, neutron activation analysis, gas chromatography and thin film chromatography. The sensitivity, reliability and reproducibility of the methods are evaluated. References 46: 30 Russian, 16 Western.

USSR

UDC 340.67:[547.94:582.948.24

TESTS FOR THE DETECTION OF HELIOTRINE AND LASIOCARPINE IN CHEMICO-TOXICOLOGICAL ANALYSES

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 22 No 2, 1979  
pp 47-50

IKRAMOVA, M. V. and IKRAMOV, L. T., Tashkent Pharmaceutical Institute of the Uzbek SSR Ministry of Health, Tashkent

[Abstract] The potential toxic hepatitis danger of *Heliotropium lasiocarpum* Fisch. et May, found among grain crops of Central Asia, motivated tests aimed at finding sensitive and specific means for detecting the substances heliotrine and lasiocarpine. The studies were done to determine whether the heliotrine and lasiocarpine responded to the usual alkaloid reagents. Sensitive response of these substances was established. Tests were made using Frede's reagent, Reineke's salt, gold hydrochloric acid, and ferric iodide. Results indicated that heliotrine and lasiocarpine are detected by these processes in chloroform extracts of alkaloid solutions. The results were confirmed by chromatography.

USSR

UDC 340.67:616.634.95:615.22:547.918:582.937

LEGAL-CHEMICAL DETERMINATION OF STROPHANTHIN K IN THE URINE

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 22 No 2, 1979  
pp 50-53

VLASENKO, L. M., Scientific Research Institute for Forensic Medicine, USSR Ministry of Health, Moscow

[Abstract] Ethylacetate was used to remove strophanthin K from urine, with extraction of the glycoside accomplished through saturation with ammonium sulphate, when precipitation using base lead acetate and adsorption on aluminum oxide had proved insufficient. Thin film chromatography enhanced the precision of the test method. Procedures followed in the tests are detailed. When the urine tested was kept at room temperature for 3 days, the yield of strophanthin K declined by 13.7%, which should be kept in mind for legal evidence use of the test. A minimum detection level of 20 micrograms, and a measurement limit of 40 micrograms per 100 ml of urine were established for the method.



## DISTRIBUTION OF POSTTRANSFERRIN (Pt) TYPES IN THE POPULATION OF BULGARIA

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 22 No 2, 1979 pp 34-37

PAVLOV, P. S. and RADANOV, S. D., Department of Forensic Medicine of the Varna Medical Faculty, Medical Academy, Bulgaria

[Abstract] The distribution of posttransferrin (Pt) types in northeastern Bulgaria was studied for ethnic anthropology and for use in disputed paternity cases by analyzing serum from 1163 adults from 18-45 of both sexes. The erythrocyte mass was removed and the serum mixed with merthiolate at a ratio of 1:100,000, the serum was then processed by high-voltage electrophoresis in a starch gel. Six phenotypes of posttransferrin were discovered, with a distribution similar to that in other ethnic groups, such as the German population. Theoretical and test data were statistically valid, and indicate that the Bulgarian population is in genetic balance. The Pt system was judged acceptable as medical evidence in cases of disputed paternity. Figure 1; no references.

USSR

CONDITIONS NECESSARY FOR OBSERVATION OF THE BIOLOGICAL EFFECTS OF  
MICROWAVES

Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian No 1, 1979 pp 70-72

ARBER, S. L., Moscow

[Abstract] This is a review of the non-thermal mechanism of action of microwaves (MW) on living systems. Another review by Arber, published in this same journal (No 3, 1978, pp 59-65), did note the conditions which must be fulfilled, viz., protraction of the irradiation process (on the order of dozens of minutes, and more) and maintenance of temperature constancy in the system during the irradiation, to realize the cellular, subcellular and molecular effects of MW. This review of MW action notes that a very high frequency field can induce a thermal effect, but this effect will obscure the specific non-thermal mechanism of MW. Various authors are cited (Arber, 1978; Presman, 1968; Lords, et al., 1973) in support of the non-thermal action; temperature control is essential to assure a pertinent trigger response by the tissues. Prolongation of the irradiation (see, also, Portela, et al., 1977; Krapivinskiy, et al., 1975) leads to change in conformation of the tissue protein structure, and changes of structure and functional properties of membrane systems in the very high frequency field. Adey (1977) is referred to concerning the hypothesis of trigger processes of biological systems in an electromagnetic field. References 13: 9 Russian, 4 Western.

USSR

DETERMINATION OF THE REQUIREMENTS FOR UNIFORMITY OF THE ELECTRIC FIELD IN  
THE BULK OF BIOMATERIAL DURING DEFROSTING IN A VHF FIELD

Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian No 1, 1979 pp 73-77

SHESTIPEROV, V. A., Moscow

[Abstract] Blood components and body organs to be used for hemotherapy and surgical replacements, and which have been preserved at low temperatures ( $-196^{\circ}\text{C}$ ), may be defrosted by microwave thawing (Woss, et al., 1974; Timoshenko, et al., 1976). The present article examines conditions for thawing in a very high frequency field which will maintain temperatures below a critical level in the volume-space of the biomaterial being

thawed. The approach is mathematical; an equation is derived for rate of change of temperature in the biomaterial subjected to uniform VHF field and uniform temperature. Elements of the equation define temperature changes due to heat exchange from the surrounding space and those due to temperature dependencies of the coefficients of losses and of heat capacity. Three stages of thawing are described mathematically: the first, where the biomaterial is crystalline; the second, where the substance undergoes a phase change; the third stage, where the liquid is being warmed. Changes in temperature of the biomaterials during thawing by a water bath, a VHF field, or a combination of the two, are portrayed graphically. Data permit calculation of requirements for magnitude and uniformity of an electric VHF field in the bulk of the biomaterial which will provide the necessary speed of thawing and the acceptable temperature transfer. Yu. P. Timoshenko was the guiding light in this work. Figures 2; references 8: 6 Russian, 2 Western.

#### USSR

##### ACTION OF A CURRENT OF CHARGED PARTICLES ON BACILLUS MESENTERICUS AND PSEUDOMONAS FLUORESCENS BACTERIAL CULTURES

Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian No 1, 1979 pp 65-66

OSTAPENKOV, A. M., KAPTEREVA, YU. V., MERINOV, N. S. and LAVROVA, V. L., Moscow

[Abstract] The apparatus used in this work was developed at the Moscow Technological Institute of the Food Industry. Aeroions are produced in a corona discharge, the sign of the aeroions depending on the polarity of the corona-discharging electrode. Characteristics of the instrument have been described elsewhere by Ostapenkov (1976). Parameters selected for the present study were  $n_1 = 10^7 \text{ cm}^{-3}$ ; voltage of the electrical field in the area of the cultures treated is  $E = 1 \text{ kv/cm}$ . When the title cultures were exposed in meat-peptone broth, the negative ions and the electrical field did not affect their viability. When processed in a solid medium (meat-peptone agar), the exposure to the electrical field plus the negative ions lowered the viability of these two bacteria; the electrical field alone did not have any marked effect on the viability of *Bac. mesentericus* cultures in the solid medium. Figures 2; references 6 (Russian).

## CHARACTER OF EQUIVALENT PERCEPTIONS OF LOCAL VIBRATION

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4,  
Apr 1979 pp 19-23 manuscript received 13 Mar 78

BUTOVSKAYA, Z. M., ARVIN, G. I., BLINOV, N. I. and SOBOLEVA, T. I.,  
Institute of Labor Hygiene and Occupational Diseases; Branch of the  
Institute of Medical Instrument Manufacture, Leningrad

[Abstract] Following a brief look at the role of Vater-Pacini corpuscles in perception of vibration, a new approach is suggested to measurement of vibration strength, based on an analogy to the perception of noise intensity. A study is reported on perceptions--equal with respect to a reference frequency--of a broad range of frequencies at a different level of sub-threshold action. A family of curves is prepared analogous to a curve of equal loudness. Thresholds of vibration-sensitivity for various frequencies of local vibrations are located at different levels; the lowest of the sensed frequencies are 100-200 Hz, and with development of a pathological process, perception of these frequencies is affected first of all. It is suggested that this band of frequencies--for vibrational sensitivity--is the same as the band 1000-4000 Hz for sound sensitivity. Curves of equal perceptions of local vibration for the fingers and palms in the range of 16-500 Hz, in relation to a frequency of 125 Hz, have been prepared for 10 people aged 20-30, (not working in a vibration-associated job). The pictured curves are seen to possess a concave form, whose degree of concavity is defined by frequency of action and level of vibration. The greatest rise is at low frequencies (16 Hz) and high frequencies (500 Hz). When the levels of vibration are limited to the standards of SN 626-66, three groups of frequencies can be separated: low (16 Hz and below); medium (32, 63 and 125 Hz); and high (250, 500 and above). To obtain equal perceptions, the low and high frequencies require large levels of vibration; the medium, about the equivalent. The data may be used for precise setting of vibration standards. Figures 2; references 7: 6 Russian, 1 Western.

USSR

UDC 633.511:581.11:631.416

WATER CONSUMPTION BY COTTON DURING SOIL SALINIZATION

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 2, 1979 pp 19-21  
manuscript received 26 Jun 78

GLUKHOVA, T. P. and SABITOVA, Z. KH., Institute of Soil Science and  
Agricultural Chemistry, Uzbek Academy of Sciences

[Abstract] Cultivation of salt-resistant cotton on saline soils that comprise 50% of the total irrigated land in the Uzbek SSR alter the plant water utilization systems; variations in plant water consumption may be used as an index of this. Cotton with a rather high salt resistance was grown on soil with 10 (weak) and 25 meq (moderate) of NaCl, Na<sub>2</sub>SO<sub>4</sub> and MgSO<sub>4</sub> per liter of H<sub>2</sub>O. The amount of irrigation water used by the plants and evaporating from the soil surface was estimated. Soil salinity increased gradually with cotton growth stages, simulating natural conditions. The amount of water utilized decreased as soil salinity increased; the decrease in weakly salinized soil was 22-34% and in moderately salinized soil 27-50%. Cotton development accelerated on saline soils with the highest water consumption period shifting to the early growth stages. In the control variant, 58% of the irrigation water norm was utilized before blooming; for the weak NaCl salinization this value was 72% and for moderate salinization 82%. Salt toxicity and effect on plant water consumption was as follows: NaCl > Na<sub>2</sub>SO<sub>4</sub> > MgSO<sub>4</sub>. The cotton yield also decreased as a function of the degree and type of soil salinization. Figures 2; references 3 (Russian).



USSR

UDC 614.7

DYNAMICS OF SANITARY-BACTERIOLOGICAL AND VIROLOGICAL INDICES OF THE SEA  
HEALTH RESORT ZONE

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 41 No 2 Mar/Apr 79 pp  
151-155 manuscript received 6 Feb 78

GRIGOR'YEVA, L. V., BONDARENKO, V. I. and KORCHAK, G. I., Kiev Scientific  
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[Abstract] Observations over the past 7 years indicate that water pollution prevention measures have reduced fecal microfloral content. Compared to 1969, water pollution in 1971-72 was 99% reduced and in 1976 the figure was 95%. Research was conducted at 26 spots along the sea coast [apparently the Black Sea] during the spring, summer, and fall. Counts were made of colibacilli, bdellovibrios and enterophage. Several factors influence the microbial ecology: water pollution control measures, time of day, season, weather, number of people visiting the beach, pollution load, and distance from polluting sites. In 1976, compared to 1969, intestinal microflora had been reduced by 67% at city beaches, 95% at beaches near former pollution sites, and 81% at resort beaches. Saprophyte numbers fluctuated from 410 to 2,800 per ml. Samples were taken at 5, 25 and 100 meters from the shore at 8AM, 12 and 5PM. The coli index increased throughout the day at 5 meters, increased to 12 noon and then declined at 25m, and declined throughout the day at 100. The last cycle is due to pollution entering from night and evening sources. The number of enterophage has reduced 50.8% as a whole, and 37% at the most polluted port and estuary sections. The average number of plaque forming units per ml of water was lower (2-3) along the beaches than at past pollution sites (5-9). Compared to 1969, the number of positive tests for paralytic poliomyelitis virus was reduced by 10.3% in 1975-76. The Coxsackie A virus was reduced by 52.5%, Coxsackie B by 24.6%, while ECHO has increased 33.2%. The enterophage bdellovibrios was found in 95% of the samples in 1975-76. References 7: 6 Russian, 1 Western.

GELATIN AS A STABILIZING AGENT IN ARBORVIRUS HEMAGGLUTINATION TESTS AND  
HEMAGGLUTINATION INHIBITION TESTS

Moscow LABORATORNOYE DELO in Russian No 5, 1979 pp 311-312 manuscript  
received 16 Jan 78

KIRYUSHCHENKO, T. V., ROGOVAYA, S. G. and KARIMOV, S. K., Alma-Ata, Kazakh  
Institute of Epidemiology, Microbiology and Infectious Diseases

[Abstract] The discovery of a number of new arborviruses on the territory of the USSR increases the importance of methods of serological diagnosis of arborviral diseases, especially the hemagglutination (H) and hemagglutination inhibition (HI) tests. In this connection the effect of gelatin as the stabilizer of the operating dose of antigen was tested. The gelatin solution was prepared by diluting 0.1 cc of 10% gelatin concentration with 100 cc borate buffer solution (pH 9.0). Antigens from the tissue cultures of viruses of Western equine encephalomyelitis, Eastern equine encephalomyelitis, Japanese encephalitis, tick-borne encephalitis, and others were used. The findings warrant recommending gelatin as a stabilizer in H and HI tests of arborviruses at 4°C. The gelatin preparation is simple to use, economical and, in a combination with formalinized erythrocytes, makes possible a broader use of the HI micromethod in the diagnosis of arborviral infections in the laboratories of practicing institutions. References 5: 4 Russian, 1 Western.

USSR

UDC 639.31:639.211.3

CULTIVATION OF YOUNG TROUT UNDER VARIOUS CONDITIONS OF ILLUMINATION

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 157-163 manuscript received 28 Jul 78

LAVROVSKIY, V. V. and YESAVKIN, YU. I., Chair of Pond Fisheries

[Abstract] The effects of light on the growth and development of rainbow trout during the first year of life were investigated under several conditions of natural and artificial illumination. The resultant findings showed that supplementing natural conditions of illumination for 60 days with 200 lux of light from 0700 to 1900 hours resulted in a growth increase by 17.2%, while illumination from 1900 to 0700 hours yielded a 13.4% increase in growth vis-a-vis control growth. Shortening the exposure to natural illumination to 6 hours adversely affected growth. References 21: 15 Russian, 6 Western.

USSR

UDC 577.472

FRESHWATER BACTERIA AS A POTENTIAL SOURCE OF PROTEIN IN THE DIET OF AQUATIC INVERTEBRATES

Vil'nyus TRUDY AKADEMII NAUK LITOVSKOY SSR SERIYA B in Russian No 2, 1979 pp 3-8

YANKYAVICHYUS, K. K., ANTANINENE, A. S., STANKYAVICHENE, N. S. and MALAMENE, B. A., Institute of Botany, Lithuanian SSR Academy of Sciences

[Abstract] Bacteria are a source of protein in the diet of zooplankton. But while extensive information is available on the amino acid composition of the protein of various microorganisms, especially as regards essential amino acids not synthesized by the organism, relatively little is known in this respect about freshwater bacteria. To fill this gap, the amino acid composition of the protein of freshwater bacteria of the Kurshyu-Maryes Bay in the Baltic was investigated. The study comprised 19 species of freshwater bacteria belonging in 10 genera: Mycobacterium, Bacillus, Sarcina, Pseudomonas, Bacterium, Pseudobacterium, Chromobacterium, Micrococcus, Planococcus, Planosarcina, which contain a considerable proportion of protein (52.23-79.81% by weight of dry substance). The bacterial protein was found to contain all the essential amino acids; their quantity varied depending on the bacterial species from 4.19 to 47.78%, which is more than in the protein of phyto- and zooplankton (19.18 and 0.49-21.57%,

respectively). The hydrobionts investigated surpass nutrient yeast in the quantity and value of their protein and hence are a promising source of protein for industrial production. References 8 (Russian).

USSR

UDC 591.13:594.5

ENTRY OF  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ ,  $^{144}\text{Ce}$  and  $^{106}\text{Ru}$  INTO THE BODY OF FRESHWATER ANIMALS FROM AN AQUATIC MEDIUM AND FOOD

Vil'nyus TRUDY AKADEMII NAUK LITOVSKOY SSR SERIYA B in Russian No 2, 1979 pp 145-152 manuscript received 11 Apr 78

MARCHYULYENENE, D. P., DUSHAUSKENE-DUZH, R. F. and POLIKARPOV, G. G., Institute of Botany, Lithuanian SSR Academy of Sciences, and Institute of Biology of the Southern Seas, Ukrainian SSR Academy of Sciences

[Abstract] Aquatic animals, unlike land animals, live in a medium representing a diluted solution of organic and mineral substances. Hence their metabolism is different, since they absorb nutrients, especially mineral ones, directly from the aquatic medium rather than through the alimentary tract alone. In this connection, the role of food and water in the buildup of strontium-90, cerium-144, cesium-137, and ruthenium-106 by the bodies of freshwater animals belonging in various taxonomic groups (molluscs, insect larvae, and fish) under experimental conditions, as well in the buildup of strontium-90 by the bodies of fish and molluscs under natural conditions, was investigated. The material for investigation was collected from open water bodies in Southeastern Lithuania. The experiments were performed in three variations. In the first, the animals were kept in radioactive water in which they received nonradioactive food (pond fish) or were not fed at all (zebra mussels, midge larvae, and yearling carp). In variation 2, the animals were kept in radioactive water and fed radioactive food. In the third series, the animals were kept in non-radioactive water and fed radioactive food. The radionuclides were added in the form of chlorides to the aquariums at the rate of  $10^{-5}$  Ki/liter. The buildup factor was determined through radiometric assay with the aid of MST-17 and SBT-13 end-window counters. It was established that the uptake of the radionuclides of  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ ,  $^{144}\text{Ce}$ , and  $^{106}\text{Ru}$  in experimental conditions, and of  $^{90}\text{Sr}$  under natural conditions, from radioactive food into the body of freshwater animals was less active and lower than their uptake from the aquatic medium. The radionuclide buildup levels in freshwater animals due to uptake from radioactive food were found to vary depending on the physicochemical state of the radionuclides and on the concentration of isotope and nonisotope carriers in the aquatic medium, in food, and in the body itself. No correlation could be established between the buildup factors of individual radionuclides in the body of freshwater animals and the buildup factor in food or the type of their diet. Figures 1; references 17: 14 Russian, 3 Western.

USSR

UDC 576.858.095.383.07

## INTERFERON TITRATION METHOD BASED ON BACTERIAL TEST CULTURE

Moscow LABORATORNOYE DELO in Russian No 5, 1979 pp 272-274 manuscript received 20 Sep 77

PECHERKINA, S. A., YAKHLAKOVA, G. V. and PATRUSHEV, F. M., Chair of Microbiology, Perm' Medical Institute; Interferon Division, Perm' Scientific Research Institute of Vaccines and Sera

[Abstract] A simple technique for interferon determination with the aid of a staphylococcal culture is proposed. A culture highly sensitive to interferon was detected among 62 strains of staphylococci isolated from pus of patients and from other sources. It is represented by *Staphylococcus albus*, which displays hemolytic and moderate plasma-coagulating activity, weak susceptibility to penicillin, erythromycin, streptomycin, levomycetin, and tetracycline, is impervious to lysis by lysozyme of the blood serum, saliva, egg white, and is not affected by the serum complement of donors and laboratory animals. Such a culture can be used to determine interferon activity, as demonstrated by model experiments with the titration of 19 series of commercial human leukocytic interferon produced by the Perm' Scientific Research Institute of Vaccines and Sera. The titration is performed by the series dilution method. The dry preparation is diluted 1:32 with distilled water, 1 cc is transferred to a test tube containing 1 cc of meat-peptone bouillon (MPB), and this is followed by double dilutions. Zero point one cc of a billionth suspension of the diurnal staphylococcus culture is added to the test tube which is then incubated in a medical thermostat for 18 hr. The bacteriostatic activity of the interferon is determined from the absence of visible growth of bacteria in the test tube. The bactericidal titer is determined on reseeded 1 calibrated bacterial loop of the material from the test tubes in which there was no growth of the culture onto meat peptone agar in a Petri dish separated into 5-6 sectors. The maximum dilution of interferon that still inhibits the growth of test cultures on agar is taken as the bactericidal titer. The experiments also showed that interferon directly affects the staphylococcal test culture by killing or suppressing reproduction of the bacteria, and hence the bacterial culture serves to detect interferon of various origin regardless of the species of producer. This is a valuable advantage of the new method, since it precludes the need for keeping the cell culture and the test virus in accordance with the species of the microorganism in whose fluids interferon is to be detected. The possibility of titrating interferon of any origin by this method was corroborated by tests of blood serum samples from donors, guinea pigs, and rabbits. The new method is simple, rapid, and readily accessible. References 1 (Russian).



USSR

UDC 576.851.5

SPONTANEOUS APPEARANCE AND DYNAMICS OF ACCUMULATION OF DEGENERATE FORMS  
IN COMMERCIAL CULTURES OF *BACILLUS THURINGIENSIS* VAR. *GALLERIAE* STRAINS

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 2, 1979 pp 11-13  
manuscript received 9 Feb 78

TROITSKAYA, YE. N., Central Asian Scientific Research Institute of Silkworm  
Breeding

[Abstract] Natural mutations in crystal-forming, entomopathogenic *Bacillus thuringiensis* cultures affect the production efficiency and toxic properties of the bacterial insecticide product. *B. thuringiensis* var. *galleriae* (152 strains) isolated earlier from various insect species produced colonies with dense convex mounds after 96-240 h of growth on solid media. These consisted of numerous cells with altered morphology, differing in form and size. Most altered cells exhibited a disturbed reproductive function, but with retention of growth capacity. The altered cells were the same size as, or smaller or substantially larger than, normal cells. Cellular detritus (membrane and lysed cell residues) was observed in these cultures. Cellular dimensions and morphology of normal and altered cells are described in detail. Electron microscopy revealed that some of the altered forms could sporulate; small endotoxin crystals were also observed in sporulating altered cells. No differences in biochemical properties or changes in the H-antigen were noted. During submerged cultivation on liquid media, cultures with morphologically altered cells formed a flocculent precipitate that made end titer estimates difficult. Insecticidal properties for silkworm caterpillars did not decrease in 10-day-old cultures with up to 60% of cells altered. Cultures free from the altered cells could not be obtained. The altered cell count increased with each reseeded of cultures. References 9: 5 Russian, 4 Western.

USSR

UDC 582.282.23

MORPHOLOGICAL AND CULTURAL PROPERTIES OF CERTAIN YEAST CULTURES ASSIMILATING  
CONDENSED GAS

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 2, 1979 pp 16-18  
manuscript received 31 Jul 78

GALKINA, N. N., BORODINA, R. A., BIL'MES, B. I., KASYMOVA, G. A. and  
RUNOV, V. I., Institute of Microbiology, Uzbek Academy of Sciences

[Abstract] With the high cost of producing protein-vitamin concentrates from paraffins, the study of the use of condensed gas which is abundant in Central Asia as the carbon source seems feasible. Morphological and physiological indices are presented for yeasts isolated from soil of the Tashkent bulk plant and from oil geysers; these were cultivated on media with 2% condensed gas from deposits in Gazli, Gugurtli, Achak and Naip. Of the 50 strains obtained, only 4 retained the ability to assimilate condensed gas. These were identified as *Candida lipolytica*, *C. curvata*, *C. muscorum* and *Torulopsis candida*. Condensed gas from which aromatic hydrocarbons had been removed by the sulfite method or by adsorption on silica gel was utilized most intensely. The yeast biomass produced on condensed gas contained 57-63% crude protein and 50-57% amino acids, 50% of which were essential amino acids. References 6: 4 Russian, 1 Czech, 1 Western.

USSR

UDC 576.852.184.095

ASSIMILATION OF HYDROCARBONS BY MICROORGANISMS OF THE NOCARDIA GENUS AND  
"RHODOCHOROUS" GROUP

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 41 No 2, Mar/Apr 79 pp  
110-114 manuscript received 18 Jan 78

NESTERENKO, O. A., KASUMOVA, S. A. and KVASNIKOV, YE. I., Institute of  
Microbiology and Virology, Ukrainian SSR Academy of Sciences

[Abstract] Microorganisms with IVth type of cell wall and LCN-A lipids were raised in media containing n-alkanes (C<sub>12</sub>-C<sub>23</sub>) from Ukrainian soils. There were 35 strains of *Nocardia asteroides*, divided into two subgroups on the basis of ability to grow in C<sub>6</sub> and C<sub>10</sub>. Most of the organisms grow well in media containing liquid (C<sub>11</sub>-C<sub>17</sub>) and solid (C<sub>18</sub>, C<sub>19</sub>) n-alkanes. *N. erythropilis* had the best overall performance. The 35 strains from petroleum-bearing soils did better than an equal number from

non-bearing soils. A series of collection strains (*N. erythropolis* ATCC 4277, *N. orasa* CBS 330, *N. rorallina* ATCC 4273, *N. rubropertincta* IMET 7301, *Mycobacterium rhodochrous* ATCC 1308) grew as well on liquid and solid hydrocarbons as did similar species isolated from soils. The ability to assimilate n-alkanes ( $C_{13}$  -  $C_{19}$ ) can be viewed as a characteristic of the *Nocardia* species and rhodochrous group. This feature can be used as a taxonomic characteristic. Only *N. asteroides*, *N. erythropolis*, *Nocardia* sp. (group EO), and *N. rhodochrous* assimilated a mixture of propane, natural gas, and air. A detailed table presents these data. References 11: 4 Russian, 2 Ukrainian, 5 Western.

USSR

UDC 613.6:636.592/07:612.017.1

CONDITION OF IMMUNOBIOLOGICAL REACTIVITY OF THE BODY OF WORKERS ON  
TURKEY PROCESSING FARMS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4,  
Apr 79 pp 53-55 manuscript received 9 Nov 77

D'YACHUK, I. A., Kishinev Medical Institute

[Abstract] Labor conditions on poultry farms include unpleasant air condition, dust, vapors (ammonia,  $H_2S$ , high  $CO_2$  content), high bacterial and mould contamination, noise. Extensive hand manipulations, cleaning and washing food trays, cages, preparation and dispensing of feed and poor illumination tend to create feelings of stress. This report examines conditions at two turkey farms (Komratskaya and Voznesenskaya). Measurements (on workers) were made of phagocytic activity of neutrophils, count of skin bacteria (sequentially measured after 15, 30 and 45 minutes in the observed areas) and of Vitamin C in the urine. Findings were interpreted to indicate unfavorable changes in bodily reactivity which could lead to sicknesses. Conditions at the Voznesenskaya farm were worse than at the Komratskaya farm. Introduction of health-promoting changes is essential. No references (except to earlier work of D'yachuk, and others, throughout the text).

USSR

UDC 613.632:547.26'128+616.5-001.36:547.26'128/-074:543.544

GAS CHROMATOGRAPHY ASSAY OF METHYLPHENYLDIMETHOXYSILANE IN AIR OF WORK  
SITES AND ON THE SKIN OF PEOPLE

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4,  
Apr 79 pp 55-56 manuscript received 25 Aug 77

PEREL', S. S. and KOPYLOVA, E. V., Rayon Sanepid Station, Dankov

[Abstract] The title substance (MPDMS) is used as a stabilizer in mixtures based on siloxane caoutchoucs and highly-active fillers. The KHROM-4 apparatus with a flame-ionization detector on a 3 m column, internal diameter 4 mm, was used for the gas chromatography assay; E-301 5% elastomer was the liquid phase; chromosorb C and celite 545 were used as adsorbents. Reproducibility and accuracy of assay results are tabulated; minimal amount of MPDMS detectable was  $0.0008 \text{ mg/cm}^2$ . Assay techniques are given in detail. Assay time is 12 min. Toluene, benzene and methanol do not interfere in the determination. References 3 (Russian).

**PHYSIOLOGICAL-HYGIENIC EVALUATION OF LABOR CONDITIONS OF STAMPERS ENGAGED IN FINISHING OF ROLLED IRON**

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4, Apr 79 pp 47-49 manuscript received 10 May 78

PARAN'KO, N. M., ZEMLYAKOVA, T. D., KACHAN, ZH. V., KALINICHENKO, G. S., YEVTUSHENKO, V. V., BELITSKAYA, E. N., KHLEBNIKOV, V. V. and CHUB, L. YE., Dnepropetrovsk Medical Institute

[Abstract] The reported studies-on effects of vibration (for exceeding permissible levels), noise (95-105 dBA), condition of the air, heat, dust--were made at the Metallurgical Plant imeni Dzerzhinskiy. The workers use pneumatic hammers (KE-16 type) or firing, to "clean up" defects in piping. The conditions caused depression of sensory acuity, particularly in hearing and lowered capacity for work toward the end of the work shift. The Ukrainian Ministry of Ferrous Metallurgy has instituted some corrective and prophylactic measures in plants subordinate to it--sound-proofing, appropriate gloves. Figure 1; references 4 (Russian).

**CARDIOVASCULAR DISTURBANCES CAUSED BY OCCUPATIONAL FACTORS AND APPROACHES TO THEIR STUDY**

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4, Apr 79 pp 23-27 manuscript received 15 Aug 78

MONAYENKOVA, A. M., GLADKOVA, YE. V. and RADIUNOVA, G. K., Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow

[Abstract] Many years of clinical examination at the authors' clinic have revealed the effects of industrial factors on the very reactive cardiovascular system. Chemical action, e.g., poisoning leading to oxygen insufficiency and dystrophic myocardial changes and vascular dysfunction; prolonged exposure to agents such as H<sub>2</sub>S, lead, aromatics which affect the CV system; physical action, e.g., noise vibration, ionizing radiation, electromagnetic waves--are industrial factors of concern. The CV changes vary in nature and severity and can be either accompanying disorders or the primary effect. Prolonged exposure can lead to the syndrome of neurocirculatory dystonia, seen as a neurosis



of the higher vegetative centers in the hypothalamus. Syndromes resulting from exposure to the various industrial factors (chemicals, physical forces) are described. So-called epidemiological studies are seen to be the most reliable material to understand the CV changes caused by occupational stresses; proper selection of the population of workers to be studied is essential. The epidemiological approach should adhere to correct epidemiological techniques. Evaluation of findings would involve comparison of findings with data on initial states of health. The danger of underestimating the effect of the many factors involved is suggested. No references (except, in text, to authors of related studies).

USSR

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ACOUSTIC ADAPTATION AS A TEST OF OCCUPATIONAL FITNESS OF WORKERS EXPOSED TO INTENSIVE INDUSTRIAL NOISE

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4, Apr 79 pp 27-30 manuscript received 10 May 78

OSTAPKOVICH, V. YE. and PONOMAREVA, N. I., Institute of Labor Hygiene and Occupational Disease, USSR Academy of Medical Sciences, Moscow

[Abstract] This is a study of the indices of auditory adaptation of workers in noise-associated jobs, and a comparison of these indices in people who are resistant, or highly sensitive to the action of sound. Measured were threshold increment, in dB, stability of the sound threshold after exposure to noise, time of recovery of sound threshold to its initial level. Workers examined were machinist-fitters, weavers and foundry trimmers--a total of 1082--who were exposed to high frequency sound, exceeding the maximum permissible level by 15-25 dB. Of these, 62 were "sound-resistant" (long years of work without loss of hearing or cochlear neuritis) and 82 "sound-susceptible" (cochlear neuritis in the first 10 years on the job). Findings reflected individual sensitivity. The sound-susceptible group took longer to recover their initial sound threshold. Data suggest that these tests can be used to augment the usual audiometry tests in selection of candidates for noise-associated jobs. References 13: 10 Russian, 3 Western (one East German).

USSR

UDC 616.24-003.66-034

#### MECHANISM OF CLEARANCE OF DUST FROM THE LUNGS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4, Apr 79 pp 31-36 manuscript received 5 Apr 78

VELICHKOVSKIY, B. T., ARUTYUNOV, V. D. and KRUGLIKOV, G. G., Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow

[Abstract] A brief discussion is presented of the role of the "dust depot" in pneumoconiosis and the problem of elimination of dust from the lungs. The article then reports its study of the physiological processes involved in elimination of 3 mcg particles of quartz dust by adult white rats, over a 7 and 14 day period. Electron microscope studies (Kwikscan-100) and electronic microanalysis (Cameca MS-46) were employed to follow the dust elimination. The removal process takes place in two stages: i) the particles initially scattered on the alveolar walls are concentrated into particle aggregates; ii) the aggregates are then moved into the lumen of a bronchiole onto the "mucociliary escalator," via dust-loaded macrophages. In the first stage, the concentration helps to free the respiring lung surface and to restore normal gas exchange in the lungs; it also prevents formation of coniphage plugs in the acinic ostia. Figure 1; references 9: 8 Russian, 1 Western.

USSR

UDC 615.917'412.4.033/034

#### STUDY OF THE INTAKE, DISTRIBUTION AND ELIMINATION OF DICHLOROETHANE IN RATS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4, Apr 79 pp 36-40 manuscript received 24 May 78

SOPIKOV, N. F. and GORSHUNOVA, A. I., Moscow

[Abstract] This study was done on sexually-mature, male outbred white rats (200-280 g) which were administered 1,2-dichloroethanol (DCE), intragastrically or intra-abdominally, in sunflower oil, intravenously and by inhalation in a chamber. Data on the fate of inhaled DCE are tabulated; 70-90% of the inhaled substance is absorbed (assay of DCE in inhaled and exhaled air). Blood levels attained are a function of duration of inhalation. Absorption of DCE from the stomach and abdomen is also a function of time. The DCE levels in blood (for the various modes of

entry) always exceeded the levels in the internal organs (liver, kidneys, heart, adrenals, spleen, pancreas); levels are least in the lung tissue. Elimination in expired air is the primary mode of elimination of the substance. The alveolar membrane is susceptible to damage by the gas. References 9: 7 Russian, 2 Western.

USSR

UDC 616.24-003.66-07:616.24-008.953-008.13

#### ALVEOLAR PHAGOCYTOSIS OF DUST PARTICLES AND ITS REGULATION (REVIEW)

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4, Apr 79 pp 40-43 manuscript received 6 Dec 77

PRIVALOVA, L. I., Institute of Labor Hygiene and Occupational Diseases, Sverdlovsk

[Abstract] Soviet and foreign literature was used in preparation of this review. While most (up to 99%) of the inhaled masses of dust are eliminated from the lungs, the residual 1-2% are the cause of pneumoconiosis. Particles are removed from the upper third of the respiratory tract by ciliary action; in the alveolar area, phagocytizing cells (macrophages and neutrophil leucocytes) facilitate passive removal of particles to the ciliary elimination area. In addition to citations of contributions of foreign authors (e.g., Cline, Bowden, Rasche, and others), mention is made of the work of B. T. Velichkovskiy, S. K. Starikova and B. A. Katsnel'son (quartz dust), of the author Privalova (regulatory action of products of destruction of macrophages) and of A. V. Bykhovskiy (biogenic stimulators of phagocytic cells). References 36: 7 Russian, 29 Western.

## ASSESSMENT OF VIBRO-ACOUSTIC PARAMETERS OF RIGS FOR CUTTER DRILLING

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4,  
Apr 79 pp 43-45 manuscript received 1 Mar 77

VYSHCHIPAN, V. F. (Krivoy Rog) and YEGOROV, V. S. (Moscow), Institute of Labor Hygiene and Occupational Diseases; The GRCh [sic] Institute of the State Institute for the Planning of Ore Concentration Machinery

[Abstract] The SBSH type rig for cutter drilling is the kind most frequently seen in ferrous and light metal mines. Vibration and noise generated in the separate operations of their use--drilling, drill disassembly, drill placement, blowing, transfer to new drilling position, levelling--are tabulated. Data are presented on parameters of vibration in the cabin (floor, seat, console) of an operating SBSH-250 MN and of noise in the cabin of a typical SBSH. The vibrations problem is the more serious, and worst during the drilling. The noise factor remains within acceptable limits. Figures 2; references 4 (Russian).

USSR

UDC 628.51:618.8

"MIKROOAZIS" APPARATUS FOR IMPROVEMENT OF THE MICROCLIMATE AT PLACES OF WORK

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4, Apr 79 pp 57-58 manuscript received 28 Feb 78

SHLEYFMAN, F. M., Kiev, and BORISOV, V. I., Novorossiysk, Institute of Labor Hygiene and Occupational Diseases; Institute of Labor Protection in the Construction Materials Industry

[Abstract] The "Microoasis" (micro oasis) apparatus is pictured in this report. It is a three-sided upright screen--presumably manufactured by Gipromez, Promstroyproekt--for protection of workers in hot shops of glass plants from the heat. Each side has a series of vertical glass tubes through which cold water is run; conditioned air enters from the jalousied top of the supporting frame. In particular, the device is used for protection of workers on VVS machines, i.e., machines which mechanically draw out molten glass vertically into panes or plates; one worker handles three machines. Its effectiveness was tested at the Gomel' glass plant (in 1977). Parameters are given; the screen has been introduced in a number of plants.



USSR

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SORPTION ACTIVITY OF CATION EXCHANGE RESIN PRODUCED IN USSR RELATIVE TO INFLUENZA A [H<sub>3</sub> N<sub>2</sub>] PORT CHALMERS STRAIN VIRUS

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 41 No 2, Mar/Apr 79  
pp 161-165 manuscript received 20 Dec 77

FROLOV, A. F., MITCHENKO, V. P., MEDVEDEV, I. N., BELYAKOVA, YE. M.,  
CHAPLINSKAYA, S. P., RYBINSKAYA, L. N. and MEL'NIK, A. V., Kiev Scientific  
Research Institute for Infectious Diseases

[Abstract] Three Soviet-made cation exchange resins: KU-2-8S, KU-23 both in the Na<sup>+</sup> NaK<sup>+</sup> forms and KRS-2p in the Na<sup>+</sup> form have good absorption properties for this strain, both under static and dynamic conditions. Changes in temperature and pH did not have a major effect on the filtration of the virus by KU-2-8S. Hemagglutination activity was highest ( $1.0 \cdot 10^3$ ) KU-2-8S NaK<sup>+</sup> at 4 C and pH 7.0, it was lowest for the same resin at 4 C and pH 5.1 ( $7.7 \cdot 10^2$ ). Highest of all was KRS-2p Na<sup>+</sup> ( $4.2 \cdot 10^3$ ) at 20C and pH 7.0. Samples were taken at 1, 5 and 24 hours. There is a very strong and practically irreversible bond formed between the resins and the virus. Absorption capacity varied directly with the hemagglutination and infectious activities. Tables 2; references 6: 5 Russian, 1 Western.

USSR

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## SURVIVAL RATE OF ESCHERICHIA COLI B BACTERIOPHAGE T2 AND ESCHERICHIA COLI K12 BACTERIOPHAGE MS2 IN DIALYSIS AND STORAGE

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 41 No 2, Mar/Apr 79 pp 177-179 manuscript received 15 Mar 78

MIKOVSKAYA, G. N., GLOBA, L. I. and ROTMISTROV, M. N., Institute of Colloid Chemistry and Chemistry of Water

[Abstract] T2 Escherichia coli B and MS2 Escherichia coli K-12 cultures, having high infectious titers and low content of ions and low molecular weight contaminants, and which retain their infectious properties during storage or agitation, were obtained by multistage hypotonic dialysis at 4°C for 24 hours. Electrical conductivity tests show that the salt content of the virus containing liquid was reduced 200 fold and approached a level of 0.003 h in a solution of KCl. The number of plaque forming units per ml was: for 12 600  $\pm$  085 initially, and after 30 days 5.67  $\pm$  0.82, for MS2 the figures were 93.33  $\pm$  10.65 and 91.33  $\pm$  10.53. References 10: 5 Russian, 1 Ukrainian, 4 Western.

USSR

STUDIES ON THE EFFECT OF SOME ALPHA VIRUSES ON THE CELL LINE OF THE  
CHINESE STRIPED HAMSTER

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 41 No 2, Mar/Apr 79  
pp 179-181 manuscript received 3 May 77

DULEVICH, ZH. A., TOPCHIY, M. K., Kiev State University

[Abstract] The animals (clone 237, with a modal number of chromosomes of 18-20) were infected with Semliki and Sindbis forest virus, and Venezuelan equine encephalitis virus (VEV). The results of 6 experiments, with 5 repetitions each, were analyzed for effects on mitotic activity, and chromosome activity. Four different controls were used. Forty eight hours after infection, mitotic activity had decreased by 42% compared to the controls. The number of cells with chromosomes less than  $2p$  and  $2p$  had declined and the number with less than  $3p$  and  $4p$  had increased, i.e., a shift from haploid and diploid to triploid and tetraploid. Compared to controls, the number of cells with structural changes in their chromosomes was 4.7 fold greater when infected by Sindbis, 4.6 for Semliki, and 4.5 for VEV. These results agree with previous studies cited. Mitotic activity is initially stimulated, then declines. Chromosomes remain in the metaphase, and fragmentation and lysis occurs. The effect is nonspecific. A table presents biometric data. Figures 2; references 7 (Russian).

USSR

UDC 576.852.132

MELANIN-PRODUCING STRAINS OF PSEUDOMONAS AERUGINOSA

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 41 No 2, Mar/Apr 79 pp 120-124 manuscript received 29 Dec 77

TYDEL'SKAYA, I. L. and ROZHAVIN, M. A., Kiev Institute for the Advanced Training of Physicians

[Abstract] Of the 40 strains of *P. aeruginosa* studied, 38 were taken from cancer patients. Since melanin producing strains are usually only 2-3% of cultures found in clinical sources, it is thought that there is a relationship between malignancy and the ability to produce melanin. Eighty percent of the *P. aer.* found in purulent wounds were melanin producing. The figures were much lower for those found in urine (5%) and sputa (7.5). None of the strains differed morphologically from standard representatives of the species. The producing strains are partially or completely incapable of assimilating leucine, tyrosine, tryptophan, phenylalanine, and ethanol

as the only sources of carbon and nitrogen. With regard to other characteristics (presented in tables) they were similar to nonproducing strains. In this respect research results coincided with Yabuuchi, and Ohyama (1972), using collections from France, the FRG, the US, and Japan. Melanin is synthesized in a King A solution, but not in a King B. The production is temperature sensitive, cultures became more stained at 42 C than at 37 C. Figure 1; references 19: 3 Russian, 1 German, 15 Western.

USSR

UDC 576.851.48/.49.07

SIMPLIFIED AND ACCELERATED TECHNIQUES FOR IDENTIFYING THE GENERA OF BACTERIA OF THE BACILLUS COLI GROUP

Moscow LABORATORNOYE DELO in Russian No 5, 1979 pp 282-284 manuscript received 5 Dec 77

KALINA, G. P., Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman

[Abstract] The concept of "bacteria in the Bacillus coli group" (BBCG) is not taxonomic but utilitarian and as such widely employed in sanitation microbiology. This group comprises representatives of various genera and tribes, principally Escherichia, Citrobacter, Enterobacter, and Klebsiella. In this connection, a rapid and simple technique for identifying the genera of BBCG within 24 h by determining their 9 attributes on the basis of 4 media (test tubes) is proposed. In the first medium, the citrate test and the indole and H<sub>2</sub>S production tests are combined. In the second medium, the reaction with methyl red and the acetoin production test and the Clark reaction with methyl red are combined. In the third medium, the mobility test and the ornithine-decarboxylase test are combined. In the fourth medium, arabinose fermentation and urease activity are determined. The composition of each medium is specified. References 10: 2 Russian, 8 Western.

## STANDARDIZATION OF SEEDING CONDITIONS AND THE PRINCIPLES FOR EVALUATING THE SUITABILITY OF DENSE NUTRIENT MEDIA FOR THE MENINGOCOCCUS

Moscow LABORATORNOYE DELO in Russian No 5, 1979 pp 266-269 manuscript received 26 May 78

KOSTYUKOVA, N. N., GADZHIYEVA, A. G., FAN'KOVSKAYA, E. K. and BORISHPOLETS, Z. I., Moscow, Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences; Dagestan Institute for the Production of Nutrient Media, USSR Ministry of Health, Makhachkala

[Abstract] Normally it is difficult to evaluate the suitability of nutrient media for the cultivation of meningococci, owing to the extremely short lifespan of these microorganisms in laboratory conditions. In this connection, the authors recommend the following procedures designed to isolate the most suitable nutrient media: statistical processing of the findings on the basis of, among others, the t-test and the Student test; use of 31 Petri dishes for each seeding of suspension, since the number 30 is the minimum sample suitable for statistical processing; replacement of isotonic table salt solution with 2% peptone water in the preparation of series dilutions of meningococcal test culture suspension. The standardization and optimization of these stages resulted in reducing the scatter of findings and tripling the growth rate of meningococci. It is further recommended that freshly isolated and lyophilized strains of meningococci be used for test cultures. The laboratories developing and testing nutrient media for meningococci should perform selection of strains for testing the various media and maintain a substantial reserve of vials with simultaneously dried test cultures. A single series dilution ( $10^5$ -fold) of the original test culture suspension for seeding onto tested media in 5 dishes is recommended, along with mandatory statistical processing of the findings to determine their reliability and detection of major differences between the media compared. In addition to the quantitative indexes of meningococcal growth, when evaluating the nutrient medium, allowance should be made for rapid and distinct pigment-formation due to the nonpathogenic *Neisseria* inhabiting the human nasopharynx (*N. subflava*). References 9: 7 Russian, 2 Western.

USSR

UDC 576.851.232.077.3

IDENTIFICATION OF SPECIES OF THE FAMILY NEISSERIACEAE BY THE REVERSE IMMUNOELECTROPHORESIS INHIBITION METHOD

Moscow LABORATORNOYE DELO in Russian No 5, 1979 pp 263-266 manuscript received 27 Apr 78

LEBEDEVA, M. V., Moscow, State Scientific Research Institute for the Standardization and Monitoring of Medical Biological Preparations imeni L. A. Tarasevich

[Abstract] At present, microbes of the genus Neisseriaceae are chiefly identified by the time-consuming method of investigating the enzymatic properties of the microorganisms. This paper explores the possibility of using two immunochemical tests for this purpose: reverse immunoelectrophoresis (RIEP) and reverse immunoelectrophoresis inhibition (RIEPI). The suitability of these tests for identifying laboratory strains of *N. gonorrhoeae*, *N. meningitidis*, several species of nonpathogenic *Neisseria* (*sicca*, *subflava*, *flava*, *mucosa*, *perflava*, *cinerea*) and also strains of *Br. catarrhalis*, was assessed. The RIEP test was found to be insufficiently reliable for this purpose, since it resulted in a large number of cross-over reactions. The RIEPI test, which is based on the same principles as RIEP but harbors a different potential since it includes the adsorption of the antiserum by the homologous antigen during the reaction, was found to be more promising, since it precluded cross-over reactions with nonpathogenic *Neisseria*. These findings warrant proposing RIEPI for the identification of *Neisseria* species, particularly in venereological practice, in which special importance is attached to differentiating between gonococci and nonpathogenic *Neisseria*. References 4: 2 Russian, 2 Western.

USSR

UDC 576.851.232.097.2(048.8)

BIOLOGICAL CHARACTERISTICS AND ANTIGENIC PROPERTIES OF THE GROUP OF NON-PATHOGENIC NEISSERIACEAE (LITERATURE SURVEY)

Moscow LABORATORNOYE DELO in Russian No 5, 1979 pp 259-263 manuscript received 3 Mar 78

ANDREYEVA, Z. M. and NEMIROVSKAYA, T. I., Moscow, State Institute of Standardization and Monitoring of Medical Biological Preparations imeni L. A. Tarasevich

[Abstract] The genus *Neisseria* includes, in addition to the causative agents of specific diseases (*N. meningitidis* and *N. gonorrhoeae*), other



species whose taxonomic groups still have not been determined. Some investigators isolate 6 species: *N. mucosa*, *N. sicca*, *N. perflava*, *N. subflava*, *N. flava*, *N. flavescens*, *N. mucosa* *N. catarrhalis*, previously considered one of the most typical and frequently encountered representatives of nonpathogenic *Neisseria*, is now classified in the new genus *Branhamella*. Two more species, *N. caviae* and *N. ovis*, also are likely to be classified as belonging to that new genus. Owing to the absence of genetic information, *N. animalis*, *N. canis*, *N. cinerea*, *N. cuniculi*, *N. cuniculi* var. *gigantea*, *N. genitricans*, *N. elongata* and *N. lactamicus* remain taxonomically undetermined species. The *Neisseria* represent gram-negative coccus pairs whose members face one another on the concave side. Their cell size ranges from 0.6 to 1.0  $\mu$ m. Their bacterial colonies in man average 1-3 mm in size. The nonpathogenic species can be differentiated from the pathogenic by being less demanding as to the nutrient medium and cultivation temperature and by having a higher survival rate. The optimal growth temperature for all species is 35-36°C. Utilization of hydrocarbons is a major criterion for the species-specific differentiation of the *Neisseria*. All species of the *Neisseria* contain the enzymes oxidase and catalase. The oxidase test is a reliable yardstick for differentiating the *Neisseria* from the oxidase-negative staphylococci, micrococci, and streptococci. The antigenic structure of microbes of the *Neisseria* genus has not yet been conclusively determined, but the method of diffusion in agar helium is optimal for investigating the serological features of the *Neisseria*. There occur multiple cross-over reactions that restrict the possibilities for species-specific identification by means of serological tests. Hence, at the present stage of research into the *Neisseria*, identification of representatives of the nonpathogenic species has to be based on a complex whole of cultural, morphological, biochemical, and serological features. References 37: 9 Russian, 28 Western.

USSR

UDC 576.851.214(Enterococcus).083.3

#### SELECTIVE MEDIUM FOR THE DETECTION OF ENTEROCOCCI

Moscow LABORATORNOYE DELO in Russian No 5, 1979 pp 280-281 manuscript received 11 Jan 78

SEDOV, V. I., Chair of Microbiology, Ivanovo Medical Institute

[Abstract] A readily prepared selective nutrient medium for the detection and count of enterococci is described. The medium does not require sterilization by autoclaving, which simplifies its preparation and contributes to its selectivity and sensitivity. Composition of the medium: 100 cc nutrient bouillon, 2 cc of yeast autolysate, 0.5 g sodium carbonate, 0.5 g

disubstituted potassium phosphate, 1 g glucose, 0.1 g potassium acetate, 1 g sodium citrate, 2 g potassium thiocyanate, 0.025 g potassium tellurite, and 0.0032 g cresol red. These ingredients are successively dissolved in the nutrient bouillon, except potassium tellurite and the indicator, whereupon yeast autolysate is added and pH 8.2-8.4 is established with the aid of a 15% solution of acetic acid. Thereupon the medium is heated to boiling, rapidly cooled to room temperature in tap water, and treated with 1.25 cc of 2% solution of potassium tellurite and 0.2 cc of 1.6% alcohol solution of cresol red, and mixed. The thus-prepared medium is poured into sterile test tubes and seeded with the material to be investigated. Dense medium is prepared by adding 1-2 g agar. The potassium and sodium salts and acetic acid in the medium stimulate the growth of enterococci, while the acetate, thiocyanate, and tellurite of potassium inhibit the growth of attendant gram-positive and gram-negative microflora, thus resulting in a satisfactory reproduction of enterococci. In addition, a supporting medium containing inhibitors of other streptococci can be used to isolate the pure culture and identify its species. References 12: 4 Russian, 1 Czech, 7 Western.

USSR

UDC 547.962.5.04+576.8.095

USE OF IMMOBILIZED SACCHAROMYCES CEREVISIAE BKMy-488 CELLS FOR THE ASYMMETRIC REDUCTION OF 3-METHOXY- $\Delta^{1,3,5(10)}$ , 9(11)-8,14-SECOESTRATETRAE-NEDIONE-14,17

Moscow BIOORGANICHESKAYA KHIMIYA in Russian No 5, 1979 pp 768-775 manuscript received 18 Aug 78; resubmitted 4 Dec 78 after revision

GULAYA, V. YE., ANANCHENKO, S. N. and TORGOV, I. V., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow; KOSHCHHEYENKO, K. A. and BYCHKOVA, G. G., Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino

[Abstract] The effect of various conditions for polymerization and transformation on 17 $\beta$ -hydroxysteroid dehydrogenase activity in immobilized *Saccharomyces cerevisiae* BKMy-488 cells was studied to develop an efficient microbiological method for the asymmetric reduction of 3-methoxy- $\Delta^{1,3,5(10)}$ , 9(11)-8,14-secoestratetraenedione-14,17, which is an intermediate product in estrogen hormone synthesis. The following conditions were optimal for immobilization: use of cells grown on media with androstenedione (inducer) to the end of the logarithmic or stationary growth phase, a 95:5.5 acrylamide to methylenebisacrylamide ratio a 10% gel, granules with a 1-2 mm diameter, biomass concentration of 30 mg/ml of polymerization reagent mixture and a

temperature of 8-12°C.  $Mn^{+2}$  and  $Ba^{+2}$  had a slight protective effect, with enzyme activity 5 and 10% greater than control with the use of the ions at 27 and 45°C, respectively.  $Zn^{+2}$ ,  $Co^{+2}$  and  $Sr^{+2}$  inhibited transformation. Nonionic detergents did not alter the rate of 17 $\beta$  reduction, whereas cetyltrimethylammonium bromide had an inhibiting effect on free and immobilized cells. The optimal conditions for 17 $\beta$  reduction of secodione by immobilized cells were: pH 5.9, temperature 28°C and steroid and biomass concentrations of 1 and 6 mg/ml, respectively. Complete secodione transformation occurred within 24-27 h; the secoketol yield was 85-90%, with an insignificant amount of side product (10-15%). To avoid decreased enzymatic activity with subsequent use, the immobilized cells were again incubated on an androstenedione medium; activity was maintained at the initial level for 20-25 days after 21-22 transformations after this incubation. The use of activated granules increased productivity 30-fold (135 mg with activated gel vs. 4.5 mg with unactivated gel); the activation is due to the formation of a new surface and internal yeast population after incubation and longer preservation of the cellular ultrastructure. Figures 2; references 16: 7 Russian, 9 Western.

USSR

UDC 547.962.32.07

## SYNTHESIS OF THE STRUCTURAL GENE FOR BRADYKININ

Moscow BIOORGANICHESKAYA KHIMIYA in Russian No 5, 1979 pp 776-778 manuscript received 5 Jan 79

DOBRYNIN, V. N., KOROBKO, V. G., SEVERTSOVA, I. V., BOLDYREVA, YE. F., CHERNOV, B. K. and KOLOSOV, M. N., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] The gene for the peptide tissue hormone bradykinin was synthesized. It consists of 37 base pairs with nucleotides 9-35 coding for the bradykinin amino acid sequence; the gene has half-sites for EcoRI and BamHI at its terminals. For synthesis, the gene was divided into 8 segments with segments (I) and (III) comprising supersegment (IX), (V) and (VII) supersegment (XI), (II) and (IV) supersegment (X), and (VI) and (VIII) supersegment (XII). The segments were synthesized by the phosphotriester method with protection of the 5'-hydroxyls, phosphate residues and amino groups. Enzymatic linkage of the segments proceeded in 3 stages: ( $^{33}\text{pII}$ ), ( $^{33}\text{pIII}$ ), ( $^{33}\text{pIV}$ ) and an excess of (I) were combined with T4 DNA ligase producing a 2-chain oligonucleotide (IX)·( $^{33}\text{pX}$ ) with a 75% yield; ( $^{33}\text{pV}$ ) + ( $^{33}\text{pVII}$ ) and ( $^{33}\text{pVI}$ ) + (VIII) produced the duplex ( $^{33}\text{pXI}$ )·(XII) with an 80% yield. The two halves (IX)·( $^{22}\text{pX}$ ) + ( $^{33}\text{pXI}$ )·(XII) were joined by T4 DNA ligase. Sephadex G-75 chromatography of the product produced an 85% yield of the synthetic gene for bradykinin. An alternate procedure was used for the verification of the gene, since the gene could not be separated into its complementary chains by conventional procedures. The fidelity of the structure of the oligonucleotide (IX)·( $^{33}\text{pX}$ ) was verified using nearest neighbor analysis. The 5'-terminal of the proximal end of the duplex ( $^{33}\text{pXI}$ )·(XII) was phosphorylated and joined by ligase to the duplex (IX)·( $^{33}\text{pX}$ ). The product was chromatographed,  $^{32}\text{P}$ -phosphorylated using polynucleotide kinase and hydrolyzed by BamHI. The 5'- $^{32}\text{P}$ -labeled gene was purified by polyacrylamide gel electrophoresis and the structure of its distal chains was verified by chemical degradation using the modified Maxam-Gilbert procedure. Figures 2; references 8: 3 Russian, 5 Western.

## STABILITY OF RECOMBINANT PLASMID pAS8 AND ITS DERIVATIVES

Moscow GENETIKA in Russian Vol 13 No 1, Jan 79 pp 174-176 manuscript received 25 Nov 77

SAKANYAN, V. A., DIKAREV, S. D., Institute of Genetics and Selection of Industrial Microorganisms, Moscow

[Abstract] Deletion mutants of pAS8 plasmid (*E. coli* K-12 J53 nal) were isolated to determine the nature of spontaneous and induced instability. By selecting clones resistant to P-specific phages, non-conjugative, antibiotic-sensitive mutants of the plasmid were isolated. Spontaneous instability ranged from 0 for RP4 to 70% for pAS8. In the latter case treatment with mitomycin C was 60-95% effective. Spontaneous instability of pAS8 not only involved the loss of the hybrid genome, but also of the RP4 component. To determine whether this loss was due to its hybrid nature, four deletion mutants were compared (pAS9, 10, 11, 12). The middle two were not eliminated by mitomycin C, pAS9 was 20-80% eliminated; pAS12 was 10-20% eliminated by mitomycin C. The pAS9 maintained its spontaneous instability and was eliminated by the treatment. The loss of fragments or the entire genome involved the interaction of two components of hybrid plasmids, and the lack of DNA sections causing instability. Figures 1; references 7: 3 Russian, 4 Western.



USSR

UDC 612.018-087.4

SENSITIVE AND RAPID METHOD FOR SIMULTANEOUS DETERMINATION OF DOPAMINE, NOREPINEPHRINE, SEROTONIN, AND 5-HYDROXYINDOLEACETIC ACID IN A SINGLE SAMPLE

Moscow LABORATORNOYE DELO in Russian No 5, 1979 pp 301-303 manuscript received 29 Dec 77

KOGAN, B. M. and NECHAYEV, N. V., Moscow, Laboratory of Psychopharmacology, Scientific Research Institute of Forensic Psychiatry imeni Prof. V. P. Serbskiy

[Abstract] A technique for a sensitive and fast determination of the content of various biogenic amines--dopamine (DA), norepinephrine (NE), serotonin (5-HT) and its principal metabolite 5-hydroxyindoleacetic acid (5-OHIAA), in a single sample of brain tissue, is described. Three hundred mg of brain tissue is homogenized in 3 cc of n-butanol. The homogenate is centrifuged for 15 min at 10,000 rpm and subjected to further processing. Zero point two cc of the inorganic phase is transferred to a test tube to determine serotonin, while 0.1 cc of the inorganic phase each is collected into two test tubes to determine DA and NE content through direct oxidation with EDTA buffer. Five-OHIAA is determined by treating 6 cc of the organic phase with 0.4 cc of 1% solution of cysteine hydrochloride which markedly enhances the fluorescence of the indolamines and increases the sensitivity of the method. Experimental findings on the DA, NE, 5-HT and 5-OHIAA content of certain regions of the brain of 63 male rats were found to be in agreement with the literature data. In addition, this procedure was found to assure the simultaneous determination of DA and 5-HT in small samples of whole blood. Thus the proposed procedure is highly sensitive, simple, and saves reagents, laboratory ware, and time. It makes possible the analysis of up to 100 samples within a single work day. References 9: 1 Russian, 8 Western.

USSR

UDC 340.613:617.15-076.5

COLPOCYTOLOGICAL EXAMINATIONS IN SEXUAL MATURITY

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 22 No 2, 1979  
pp 17-20

SOXOLOVA, I. F., Department of Forensic Medicine (Director--Professor  
P. G. Areshev), Crimean Medical Institute, Simferopol

[Abstract] Specimens of the vaginal content of maidens, 11-16 years old, were taken with a glass tube from the orifice of the hymen to determine the relationship between vaginal cells and sexual hormones indicating the stage of maturity of the girls. The cytological pattern was revealed by staining with methylene blue, and glycogen cells by using a Lugol solution. Estrogen stimulation and glycogen-containing cells were related to the onset of menstruation among the 130 subjects tested. Results confirm the usefulness of colpocytological tests in determining sexual maturity, along with medical history and other data. No references.

USSR

UDC 575.4:599.323.4

SELECTION OF RAT STRAINS BY LONG-TERM THRESHOLD OF EXCITABILITY OF NEUROMUSCULAR APPARATUS

Moscow GENETIKA in Russian Vol 15 No 1, Jan 79 pp 144-148 manuscript  
received 2 Jan 78

VAYDO, A. I. and SITDIKOV, M. KH., Institute of Physiology imeni I. P. Pavlov, Leningrad

[Abstract] A population of 50 male and 20 female rats was divided into groups based on high or low threshold of excitability to 50 msec electrical stimuli. Differences began in the first generation and continued to later generations. This is probably the result of the control of this factor by a few genes, as suggested by Golovachev (1976), and Savvateyeva (1976). There was a somewhat sinusoidal pattern in the high, low, and control groups, with figures for all groups (0.01 msec duration lowest (6 volts) in the first and fourth generations, highest in the second (around 8.5-9.5), and 8-9 in the third, probably due to the phenomena of dominance and overdominance. The coefficients of realized inheritability ( $h^2 = 0.48$  for the low, 0.35 for the high), indicate higher additive effects for the low group. The same genes probably control the threshold response for the different durations. The asymmetry was much less pronounced for the long-term threshold. There were no differences in morphological development. Figures 2; references 14: 12 Russian, 2 Western.

USSR

UDC 546.286:543.43

OSMOTIC AND ACTIVITY COEFFICIENTS OF 12-MOLYBDOPHOSPHORIC AND 11-MOLYBDO-1-VANADOPHOSPHORIC ACID IONS IN AQUEOUS SOLVENTS

Moscow IZVESTIYA TIMIRYAZEVSКОЙ SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 186-188

NIKOLAYEV, V. P., MIGUNOVA, L. T., DEYKOVA, Z. YE., POLOTEBNOVA, N. A. and DIKAYA, N. N., Chair of Inorganic and Analytic Chemistry

[Abstract] Calculations are presented for isopiestic determination of the osmotic and activity coefficients of the ions of 12-molybdophosphoric acid and 11-molybdo-1-vanadophosphoric acid in aqueous solvent containing sulfuric acid to inhibit hydrolysis. The calculations were based on the assumption that the osmotic coefficient of a given ion will have the same value in different solvents, if the activities of the solvents are identical. References 6 (Russian).

USSR

UDC 581.133.1

EFFECTS OF MOISTURE CONTENT, FORMS OF NITROGENOUS NUTRIENTS, AND CONCENTRATION OF NUTRIENT MEDIUM ON THE GROWTH AND PRODUCTIVITY OF SPRING WHEAT

Moscow IZVESTIYA TIMIRYAZEVSКОЙ SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 3-9 manuscript received 4 Jul 78

SALTI, S. and PETROV-SPIRIDONOV, A. YE., Chair of Plant Physiology

[Abstract] An analysis was made of several factors which determine the growth and productivity of spring dwarf wheat 150 CB grown under laboratory conditions in sand. Evaluation of the growth, productivity and developmental patterns indicated that N, in the form of  $\text{NH}_4\text{Cl}$  supplied in Knop's [sic] nutrient medium, inhibited spring wheat; inhibition was especially pronounced at low water content (40%) of the sand, as well as when the concentration of Knop's medium was increased from 0.2 to 2 "standards." The compiled data were interpreted to indicate that inhibition of spring wheat 150 CB under these laboratory conditions was due to perturbed control mechanisms regulating water-electrolyte balance which led to elevation of calcium and magnesium and depression of the potassium:bivalent cation ratio. Figures 1; references 20: 9 Russian, 11 Western.

USSR

UDC 631.51.001

# SCIENTIFIC AND PRACTICAL FOUNDATIONS OF MINIMAL TILLAGE

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 10-18 manuscript received 20 Oct 78

PUPONIN, A. I., Chair of Soil Science and Experimental Methods

[Abstract] Various factors involved in tillage and minimum tillage farming are reviewed, and justifications are provided for greater implementation of the minimum tillage approach in the USSR in relation to crop rotation practices, climatic conditions, soil type, etc. Minimum tillage is particularly suitable for the drier climates, while in areas with greater precipitation special attention must be accorded to various methods of weed control. References 47: 30 Russian, 1 Czech, 1 Hungarian, 15 Western.

USSR

UDC 633.1:[631.563+581.72

# INTENSITY OF RESPIRATION OF NEWLY HARVESTED GRAIN DURING THE FIRST FEW DAYS OF STORAGE

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 27-33 manuscript received 18 Sep 78

KARPOV, B. A., Chair of Storage Technology and Processing of Agricultural Products

[Abstract] Newly harvested Nemchinovskaya 50 rye and Mironovskaya 808 wheat grain were subjected to metabolic studies during the initial 2-4 weeks of storage at 20-22° with an initial moisture content of 18-30%. The resultant data showed that respiratory rate fell sharply during the first 3-5 days of storage (1.5-2 fold), and subsequently showed a 3-6 fold rise. The initial fall in respiratory activity was due to changes in the moisture content and changes in the microbial flora, as well as recovery from threshing-induced changes which enhanced respiration. The subsequent intensification of respiration was due to mold overgrowth under the storage conditions and spoilage. Thus, it appears that the duration of permissible storage of new grain should not exceed the period during which respiration declines and remains at a low level. Figures 4; references 6: 5 Russian, 1 Western.

USSR

UDC 631.816:631.582

USE OF BALANCED FERTILIZATION SYSTEMS IN CROP ROTATION FOR OBTAINING  
PROGRAMMED YIELDS OF DESIRED STRUCTURE AND QUALITY

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in  
Russian No 2, 1979 pp 57-64 manuscript received 5 Sep 78

BAGAYEV, V. B., ZHUKOV, YU. P. and BUKHTIY, L. V., Chair of Agronomic  
and Biological Chemistry

[Abstract] A control and 4 experimental fertilization systems were tested in the Moscow Oblast on soddy-podzolic medium loam soil for effectiveness in providing programmed levels and quality of harvests using 4 fields with the following rotations: vetch-oat mixture, winter wheat, potatoes, and rye. The 4 experimental systems consisted of NPK values of N 100%, P 60%, K 100%; N 80%, P 60%, K 100%; N 80%, P 90%, K 100%; and N 100%, P 90%, and K 100%. The results showed that use of proper fertilizer balance can be employed in securing desired levels of high quality harvests. Figures 2; references 5 (Russian).

USSR

UDC 631.46:576.851.15

NONSYMBIOTIC FIXATION OF ATMOSPHERIC NITROGEN IN RELATION TO SOIL MOISTURE,  
TEMPERATURE, AND ORGANIC MATTER

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian  
No 2, 1979 pp 71-77 manuscript received 9 Nov 78

YAGODINA, M. S., YAGODIN, B. A. and VEREVKIN, YE. L., Chair of Agronomic  
and Biological Chemistry, and the All-Union Scientific Research Institute  
of Fertilizers and Soil Science

[Abstract] Studies were conducted on nonsymbiotic nitrogen fixation as influenced by several soil factors in the case of soddy-podzolic heavy loam soil. The results showed that increasing one of the several factors under study (organic matter, temperature, moisture) led to a decrease in nitrogen fixation. However, increasing both organic matter and moisture levels in the soil while maintaining unchanged temperature favored nitrogen fixation. Combinations of organic matter + temperature or of moisture + temperature did not promote increased nitrogen fixation. Increasing all three factors simultaneously led to increased nitrogen fixation. Final analysis showed that, without introduction of additional organic matter, nitrogen fixation per month did not exceed 0.7-1.1 kg N per hectare;



introduction of 15 tons of organic matter yielded levels of nitrogen fixation ranging from 0.8 to 5.4 kg N per hectare. With 20% water content and change of the temperature from 2 to 26° nitrogen fixation of 0.6-0.9 kg N per hectare per month was obtained while in the presence of 35% moisture content, fixation stood at 2.2-5.4 kg N per hectare per month. Figures 2; references 24: 9 Russian, 15 Western.

USSR

UDC 633:631.417.2

#### EFFECTS OF FULVIC ACIDS ON CROP YIELDS

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 78-87 manuscript received 4 Sep 78

KARPUKHIN, A. I., Chair of Soil Science

[Abstract] The effects of fulvic acids on the growth and development of corn, beans, and sunflower were investigated under controlled laboratory conditions which demonstrated that corn showed greatest responsiveness to fulvic acids. In three liter growth dishes with Knop's medium, addition of 100 mg of fulvic acids was most effective in promoting early stages of corn growth, while 200 mg favored latter stages of development. In the case of plant spraying, fulvic acid concentration of 0.006% was most effective, with inhibition seen with higher concentrations. Studies with <sup>14</sup>C radiolabel showed that fulvic acids enter plants and also stimulate plant uptake of mineral and other organic matter. Figures 4; references 13: 10 Russian, 2 Czech, 1 Western.

USSR

UDC 631.417:631.445.2'4:543.226

#### DERIVATOGRAPHIC ANALYSIS OF FULVIC ACIDS IN VIRGIN AND CULTIVATED CHERNOZEMS AND SODDY-PODZOLIC SOILS

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 88-93 manuscript received 1 Mar 78

CHERNIKOV, V. A., KULCHAYEV, E. M. and KONCHITS, V. A., Chair of Physical and Colloid Chemistry, and the Chair of Soil Sciences

[Abstract] Studies were conducted on the effects of cultivation on fulvic, fulvic, and lignofulvic acids of chernozem and soddy-podzolic soils.

Derivatographic [sic] analyses demonstrated that cultivation leads to changes in the thermal stability of fulvic acid fractions, which are accompanied by an increase in the number of central groups and a decrease in the number of groups in the peripheral portion. Figures 2; references 9: 8 Russian, 1 Western.

USSR

UDC 631.811:631.445.24:546.27

EFFECTS OF DOSE AND NATURE OF FERTILIZER AND LIMING ON BORON CONCENTRATION IN SODDY-PODZOLIC SOILS

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 100-108 manuscript received 19 Sep 78

NELYUBOVA, G. L. and STAROVOYTOVA, V. P., Chair of Agronomic and Biological Chemistry

[Abstract] Investigations on soddy-podzolic soils demonstrated that the nature of fertilizer employed, and its duration of use, affected boron concentrations of the soil. Use of organic fertilizers favored an increase in mobile boron. Long-term application of a mineral fertilizer ( $N_{aa}P_cK_x$  for 63 years) led to an increase in water-soluble boron, while with a shorter period of use (13 years) only a trend toward an increase was in evidence. Sole use of potassium chloride depressed boron levels in the soil, while ammonium nitrate favored its increase. In general, long-term (27 years) liming--depending on other fertilizers--either favored an increase, no change, or a decrease. References 20: 16 Russian, 2 Polish, 2 Western.

USSR

UDC 631.434.12

COMPARISON OF CAPILLARIMETRIC AND MICROSCOPIC DETERMINATIONS OF POROSITY OF ARTIFICIAL SOILS

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 109-116 manuscript received 18 Aug 78

TORMASOV, V. A., ZHUROV, A. V., GROMYKO, I. D. and ODINOKOVA, N. S., Soil-Agronomical Museum imeni V. R. Vil'yams

[Abstract] Capillarimetric and microscopic examinations conducted on the porosity of artificial soil samples (quartz sand, clay) showed that the pore space was continuous. Comparison of the results obtained with capillarimetric and microscopic studies showed that the former approach markedly underestimates large diameter capillary pores (30-600  $\mu$ m) and overestimates the number of small pores. Figures 5; references 6 (Russian).

USSR

UDC 631.46+632.954:582.949.27

SOIL MICROBIOLOGIC ACTIVITY UNDER CLARY SAGE AFTER DIURON TREATMENT

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 117-124 manuscript received 13 Mar 78

KOLTYPINA, S. B., MAR'YENKO, V. G. and GUL'KO, N. B., Chair of Microbiology

[Abstract] Studies conducted in Crimea on southern carbonaceous chernozem showed that a single application of diuron [sic] to clary sage fields reduced weeds by 70% without affecting soil biocenosis on a long-term basis. In addition, within the range of 0.5-2.9 kg per hectare, diuron exerted a positive effect on nitrate nitrogen levels in the soil, did not promote humus degradation in the soil, and did not negatively influence the harvest of clary sage. Figures 5; references 18: 16 Russian, 2 Western.

USSR

UDC 633.511:632.954

ABILITY OF HERBICIDE-TREATED COTTON TO DECREASE ITS WATER REQUIREMENT

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 2, 1979 pp 25-27  
manuscript received 26 Jul 78

KAMILOVA, R. M., PAZYLOVA, S. S. and MUKHAMEDOVA, KH., Institute of  
Experimental Plant Biology, Uzbek Academy of Sciences

[Abstract] Herbicides elicit changes in plant metabolism with certain metabolic deviations being retained until the end of vegetation. Water consumption was studied during the fruit formation stage in the cotton cultivars Tashkent-1, C-6030 and C-4727 grown in containers with soil whose surface was treated with cotoran or "toluin" (3.0 kg/ha) after seed sowing. Daily water consumption was estimated as well as the water evaporating from the soil surface and water utilized for leaf transpiration. The herbicide-treated plants utilized less water than control. The daily saving of water was 200-500 g for "Tashkent-1," 300-800 g for "C-4727" and 200-800 g for "C-6030." Water transpiration from leaf surfaces followed a similar pattern. The decrease in water consumption had no effect on yield. Figures 2; references 7 (Russian).

USSR

UDC 633.511:576.895.7

COMPARATIVE CHARACTERISTICS OF COTTON CULTIVARS WITH RESPECT TO PEST RESISTANCE

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 2, 1979 pp 54-57  
manuscript received 20 Mar 78

ABDULLAYEV, A. A., EGAMBERDIYEV, A. E., OMEL'CHENKO, M. V., NASYROVA, D. N. and KAPUSTINA, R. I., Institute of Experimental Plant Biology, Uzbek Academy of Sciences

[Abstract] Cotton cultivars of various geographic origin (USSR, USA, Pakistan, Afghanistan, Algeria and Egypt) were studied under field and greenhouse conditions to find donors resistant to aphids and the red spider mite. Data are presented only for the aphid experiments. Almost all of the cotton cultivars were infested with aphids, but several were less affected: *Gossypium hirsutum* cultivars C-1973, C-4769 and C-9029 from the Uzbek SSR, *G. hirsutum* cv. fibre-verte from Algeria and *G. barbadense* cv. 8763-1 from the Turkmen SSR. The plant, leaf, boll and fiber morphology, growth stages and yields are described for each cultivar. *G. hirsutum* cv.

C-1973 produced a yield of 110 g of cotton per plant; C-4769, 90 g; C-9029, 80 g; fibre-verte, 33 g; and G. barbadense cv. 8763-1, 50 g. References 4 (Russian).

USSR

UDC 632.38.07

#### IMPROVEMENTS IN VISUAL AND SEROLOGIC DIAGNOSIS OF PLANT VIRUSES

Moscow IZVESTIYA TIMIRYAZEVSКОЙ SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian No 2, 1979 pp 142-148 manuscript received 4 Dec 78

SHMYGLYA, V. A., Chair of Phytopathology

[Abstract] A review is provided of the techniques and criteria employed in serologic and visual detection of plant viruses, with particular attention to potato leafroll and Y viruses. One step that can be utilized successfully in plant serology is clarification of tissue extracts used in microserologic procedures. In addition, the special problems presented by potato M virus and tobacco mosaic virus are also discussed from the point of view of silent, long-term infections akin to animal "slow" viruses complicated by the apparent absence of viral antigens in the plant tissues. References 12: 8 Russian, 4 Western.

USSR

UDC 576.858.8

#### MYCOPLASM-LIKE ORGANISMS ASSOCIATED WITH YELLOWS OF VEGETABLE CROPS IN THE LITHUANIAN SSR

Vil'nyus TRUDY AKADEMII NAUK LITOVSKOY SSR SERIYA B in Russian No 2, 1979 pp 57-62 manuscript received 29 Dec 77

STANYULIS, YU. P. and SUTKUTE, YE. A., Institute of Botany, Lithuanian SSR Academy of Sciences

[Abstract] The findings of an electronmicroscopic investigation of the phloem cells of vegetable plants infected with yellows and collected from various regions of the Lithuanian SSR during 1976 and 1977 are presented. These plants (garlic, carrots, lettuce, sorrel, parsley) were fixed in 4% glutaraldehyde in phosphate buffer 0.1 M, pH = 7.2, for 1.5 hr. Following triple rinsing in phosphate buffer the material was fixed in 1% osmium



tetroxide in the same buffer for 1-12 hr and dehydrated in an acetone series. The dehydrated material was, after sectioning, examined with the aid of an UEMV-1008 electron microscope, and found to contain mycoplasma-like organisms ranging in length from 111-770 nm for carrots to 120-1470 nm for sorrel. These mycoplasma-like organisms, not found in the phloem cells of healthy plants, warrant assuming a mycoplasma etiology of yellows. Figures 8; references 44: 5 Russian, 39 Western.

USSR

UDC 613.65:678.065-051

ERGONOMIC ASSESSMENT OF EQUIPMENT FITTED WITH FOOT-OPERATED CONTROLS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4,  
Apr 79 p 46 manuscript received 17 Aug 78

KARMAZINA, T. I., SILANT'YEV, V. P. and NEFED'YEVA, L. YE., Institute of  
Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences,  
Moscow

[Abstract] This study was done at the Kirov Tire Plant; this plant has 50 types of equipment which are operated by foot pedals by standing workers. Sometimes the devices were fitted with foot pedals simply because that was the way it had always been done. Some devices made no use of ergonomics, e.g., pedals were awkwardly placed, bodily centers of gravity were displaced in servicing. Prolonged standing and operating led to undesirable effects on the workers' musculo-skeletal system and, also, on the peripheral nervous system. Data obtained clearly pointed to need for improvement in the finishing apparatus. No references.

USSR

UDC 613.65-07:612.766.1

CHANGES IN SOME PHYSIOLOGICAL INDICES AS A FUNCTION OF DEGREE OF RATIONALITY OF STANDING POSTURE OF WORKERS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 4,  
1979 pp 49-52 manuscript received 24 Feb 78

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[Abstract] This study used an experimental rig, in the form of a puppet, fitted with simulated arms, legs, head and articulated joints to simulate various postures of the working man. The postures were defined by the need for appropriate positionings of the arms, legs, head, spine, shoulders, pelvis--as dictated by the positioning of the control elements on machines being operated by the worker. Awkward postures are caused by unfavorable sitting of control elements; these postures cannot be maintained over protracted periods except with discomfort and lead to changes in muscle bioelectric readings, tremor, increased heart contractions and stress. Optimal positionings of control elements are suggested. Figures 2; references 5: 4 Russian, 1 Polish.

USSR

UDC 616.1/.4:362.147(476)

DISPENSARIZATION IN THE BYELORUSSIAN SSR OF PATIENTS WITH DISEASES OF THE INTERNAL ORGANS

Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 51 No 1, 1979 pp 21-25  
manuscript received 26 Sep 78

MATVEYKOV, G. P.

[Abstract] (Dispensarization is a Soviet term which connotes an organized program of prophylactic measures for early identification of affected individuals or persons exposed to the threat of disease by virtue of work or living conditions. Therapy is then instituted where indicated; follow-up is scheduled and change in threatening conditions is attempted.) This form of care is available in the BSSR for individuals with various stomach disorders, hypertension, angina pectoris, diseases of the lungs, kidneys, and other disorders. There is now an average of one section for these disorders for every 2,666 inhabitants. Special therapeutic wards have been set up at many large hospitals. Not only ill, but healthy individuals are afforded the prophylactic service. People in hazardous occupations are prominent in the latter segment. Patients are divided into five groups: healthy, almost healthy, compensatory, subcompensatory, and decompensatory. At some institutions this method is used on Saturdays or by groups. There is a well-organized method for dealing with rheumatic diseases; the initial incidence rate in the capital has been reduced 1.5 fold. Almost 96% of those suffering from these disorders are treated by this method. About 50-60% of all workers in Minsk's industrial enterprises are under preventive observation. Several seminars on methods of using this type of treatment have been conducted, and methodological recommendations have been published. One physician at an outpatient clinic can keep 120-140 patients under full observation. No references.

USSR

UDC 616-001.28-092-07+615.849.2.015.25.015.4

CRITERIA FOR OPTIMAL CONTROL IN PHYSIOLOGICAL SYSTEMS IN THE ASSESSMENT OF RADIATION INJURY AND IN THE CHOICE OF THE MOST EFFECTIVE RADIOPROTECTOR OR THERAPEUTIC AGENT

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian Vol 24 No 1, Jan 79 pp 47-53  
manuscript received 1 Feb 78

MOZZHUKHIN, A. S. and TRIFONOV, YE. V., Leningrad

[Abstract] Use of the stochastic control theory is proposed to assist in seeking a reliable method for evaluation of degree of injurious action of ionizing radiation upon separate physiological systems--and, hence, upon the entire body--and for choice of the most effective radioprotector, or therapeutic agent for the pertinent radiation injuries. Such an effective method should satisfy the following criteria: i) can the method be used for both the evaluation and for the choice; ii) can it be used for each of the separate physiological systems; iii) is it universally applicable for all physiological systems; iv) can it analyze the dynamics of the systems in normal and in pathological states; v) is it highly sensitive for evaluation of the action of the radiation and the action of the agent chosen; vi) can it be used for a broad range of whole-body or local action of various kinds and doses of ionizing radiation; vii) are the inferences drawn from one physiological system reliable when applied to the total body; viii) what is its predictive worth when findings from one examination are applied to another situation; ix) is the method economical? The new approach presented in this article is based on work of Trifonov over an extended period of time (1970-1977) which indicated that i) the physiological systems are goal-directed stochastic systems of automatic control; and ii) in physiological systems, the strategy of control--optimal with respect to accuracy and rapidity of action--is prediction. Prediction of changes due to an external source, e.g., radiation, will affect accuracy and speed of control response in the systems; choice of the radioprotector or therapeutic agent will be based on the protection it provides to the predictive factor. Examples presented are treated mathematically. Figure 1; references 9 (Russian).

USSR

UDC 632.951:559.731.3

AEROSOL FOR PROTECTING THE ANTLERS OF THE SIBERIAN DEER AGAINST THE  
BOOPONUS BOREALIS FLY

Moscow IZVESTIYA TIMIRYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in  
Russian No 2, 1979 pp 182-185 manuscript received 21 Nov 77

MELUA, N. K., SIMETSKIY, M. A. and ARISTARKHOVA, N. P., Chair of Zoology

[Abstract] A novel preparation consisting of insecticides in an aerosol preparation with a film-forming compound (pantozol) has been devised for protecting the antlers of the Siberian deer against the Booponus borealis fly. Only 3-4 treatments with the aerosol suffice to protect the antlers from egg laying by the insects during the flight season. Tables 2; references 2 (Russian).

USSR

UDC 575:636.521.58

RAISING AND 5-YEAR BREEDING OF A CONTROL RANDOM BRED BROILER CHICKEN  
POPULATION

Moscow GENETIKA in Russian Vol 15 No 1, Jan 79 pp 149-156 manuscript  
received 7 Oct 77, corrected copy received 20 Jun 78

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[Abstract] White Plymouth Rock chickens imported from the Netherlands in 1962-3, and subsequently raised on several farms, were used. In 5 years the flock grew from 210 to 300 hens. The random breeding method minimized inbreeding. Generally accepted norms of feeding and keeping were observed. In 5 generations of hens, live weight ranged from 2.1 kg (F<sub>1</sub>, F<sub>3</sub>) to 2.4 (F<sub>5</sub>); egg production rose from 159.6 in 11 months (F<sub>4</sub>) to 179 (F<sub>2</sub>). These same generations also had the highest (60.6 g) average weight per egg and the lowest (58.0). Egg fertility and pullet production remained high (90-92% and 82-84% respectively). The variability of characteristics was higher in the control group. This group was crossed with the experimental birds, but the resulting weights were not much higher. Correlation coefficients between the characteristics were insignificant (except between weight and egg production during some periods). Thus, a 5-year random breeding does not reduce genetic diversity. This method can be used for genetic control and to maintain a gene pool with a minimal number of birds. Three tables present data on the characteristics, and correlations. Figures 3; references 13: 7 Russian, 6 Western.



## MEAT PRODUCTIVITY AND MORPHOLOGIC FEATURES OF CROSSED YOUNG BULLS

Moscow IZVESTIYA TIMIRYAZEVSКОЙ SEL'SKOKHOZYAYSTVENNOY AKADEMII in  
Russian No 2, 1979 pp 149-156 manuscript received 30 Oct 78

ERTUYEV, M. M. and SYSOYEV, V. S., Chair of Dairy and Meat Husbandry

[Abstract] Meat productivity and other characteristics were evaluated for 19-20 month old bulls resulting from several different crossings involving black-and-white, Kholmogorskaya, and Istobenskaya cows with Charolais, Aberdeen Angus, and Kazakhskaya white-headed bulls. The results showed that Charolais crosses produced bulls with the greatest weight and total products than obtained with the other breeds of bulls. However, the latter bulls produced offsprings with superior ratio of edible to nonedible products. References 11 (Russian).

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